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[OFFICIAL NOTICE.]

Tenth Annual Meeting of the Pacific Coast Gas Association.

PACIFIC COAST GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
HAYWARD BUILDING, SAN FRANCISCO, CAL.

The Tenth Annual Meeting of the Pacific Coast Gas Association will be held in San Francisco, Cal., Tuesday, Wednesday and Thursday, July 15th, 16th and 17th, 1902. The meeting will be called to order in the Lecture Hall of the Pacific Gas Improvement Company, in their new building, No. 455 Sutter street. A reception room, reading room, and other conveniences will be provided for the use of members during the session. All books purchased during the past year by the Library Committee, and which form the nucleus of what bids fair to become a valuable library, will be placed at the disposal of the members for their use and inspection.

The following papers will be read:

President's Address, by Mr. C. E. Burrows, Walla Walla, Washington.

"Fuel Conditions in California," by Mr. John L. Howard, San Francisco, Cal.

"Gas Advertising," by Mr. R. P. Valentine, Sacramento, Cal.

"Municipal Ownership," by Mr. Frank J. Symmes, San Francisco, Cal.

"Differential Gas Rates," by Mr. M. C. Osborn, San Rafael, Cal.

"An Experiment on the Principles of Purification," by Mr. E. C. Jones, San Fransisco, Cal.

"Electrically Operated Appliances in Gas and Electric Works," by Mr. Geo. C. Holberton, Oakland, Cal.

"The Recognition of the Engineer, with Especial Reference to Gas Engineering," by Mr. L. P. Lowe, San Francisco, Cal.

A lecture will also be given by Mr. P. W. Tompkins, Analytical Chemist, of San Francisco, Cal., upon "The Methods of Determining Water and Sediment in Crude California Petroleum."

Wednesday evening, July 16th, at 7.30 o'clock, the usual annual banquet will be given, at which members only will be in attendance.

Thursday, July 17th, an outing will be arranged for the benefit of members and their families. A bay trip, to Vallejo and the United States Navy Yard at Mare Island, is contemplated, and it is hoped that satisfactory arrangements can be made whereby the privileges of the Yard will be extended to the Association. Few travelers to San Francisco are given the opportunity to visit the upper reaches of San Francisco and San Pablo bays, whose quiet waters are broken only by the picturesque Italian fishing smack, an occasional river steamer, or the characteristic homely, square-nosed, scow schooner, which, heavily freighted, lazily drifts down the tide to the markets of the world, or plunges frantically in the sea when the cool, invigorating ocean breezes blow.

Monday evening, July 14th, there will be an informal meeting at headquarters.

Contributions to the "Wrinkle Department" should be sent to Editor Geo. S. Colquhoun, Fresno, Cal., without delay.

Those who have had experiences in the past year which might prove

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of interest to members, are requested to send them to Mr. R. P. Valentine, of Sacramento, Cal., Editor of the "Experience Department."

The Question Box is a valuable feature of the meeting. It is desirable that all questions be forwarded to the Secretary as far in advance as possible in order to secure proper attention thereto.

J. B. GRIMWOOD,
Secretary.

[OFFICIAL NOTICE.]

Wrinkle Department, Pacific Coast Gas Association.

OFFICE OF EDITOR, WRINKLE DEPARTMENT,
PACIFIC COAST GAS ASSOCIATION,
1050 J STREET, FRESNO, CAL., May 14, 1902.

To the Members of the Pacific Coast Gas Association: As the Tenth Annual Meeting of the Pacific Coast Gas Association is drawing near, it behooves me, as the Editor of your Wrinkle Department, to remind you that it is time you were sending in your contributions to this department.

Wrinkles mean any small or large device, original in idea if possible, or anything that is not generally known to the gas fraternity, and that will in any way alleviate the trials and troubles of the gas man and promote his welfare and happiness, will be acceptable as a Wrinkle. If you will send in a sketch, photo or drawing, with explanation, it will be fully appreciated at our meeting this summer, as it depends entirely on the contributions, and following discussion of the members, to make these meetings successful.

Now, please, do not be backward, but send in all the Wrinkles you can gather up at once, and before you forget it. You may sign your name or not; just as you like. You surely have around your works, office, or main and service system a lot of original ideas that would be a benefit to some other member who is working under the same conditions.

Kindly make your contributions to this department at once, so as to enable me to get them in order before the meeting. Expecting an early reply, I am,

Yours truly,
GEORGE S. COLQUHOUN.

BRIEFLY TOLD.

DEATH OF MR. E. H. JENKINS.—Seldom has the telegraph conveyed to the JOURNAL an announcement more shocking than that contained in despatches dated the 25th inst., which brought the news of the death, at San Antonio, Tex., on the morning of last Wednesday, of Mr. Edward H. Jenkins, President and General Manager of the San Antonio Gas and Electric Company. The particulars respecting his illness and its fatal termination are rather meager at the time of writing, but it is known that death resulted from blood poisoning following a slight operation, and that he had been ill for a period of 10 days. The remains were forwarded to Indianapolis, Ind., where interment was to have been made yesterday. Necessarily we can say little at this time of his career in the gas industry, but in regular order we will give as accurate a record as possible of his energetic, consistent and successful work in that field. Honored during his life by his fellow craftsmen, in death his memory is enshrined in their hearts.

NOTES.—Mr. J. A. Mayers informs us that the Pawtucket (R. I.) Gas Company has awarded to the Western Gas Construction Company, of Fort Wayne, Ind., a contract for a complete condensing plant of the Construction Company's preferred type. The rated capacity of the apparatus is 1,000,000 cubic feet per day. The contract also calls for the placing of 2 purifiers, 24 feet by 24 feet, of the deep duplex type.——The Berwick (Pa.) Illuminating Gas Company has been chartered, to supply gas for light only in the place named.——On July 1st the selling rate at Everett, Wash., will be reduced from $1.85 to $1.75 per 1,000 cubic feet.——Mr. George W. Archer, President of the Rochester (N. Y.) Gas and Electric Company, says there is no truth in the report that the named properties are to be consolidated with those of the Rochester Railway Company.——The following is the regular ticket for Directors to be voted at the annual meeting of the Consolidated Gas Company, of Baltimore, Md.: F. C. Latrobe, William W. Spence, James A. Gary, John E. Hurst, John W. Hall, William P. Frick, E. Austin Jenkins, N. W. James, G. A. von Lingen, Charles H. Dickey, John B. Ramsay and Wilton Snowden.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—Concluded from Page 921.]

PROCEEDINGS, TWENTY-FIFTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD IN THE NEW ST. CHARLES HOTEL, NEW ORLEANS, LA., MAY 21, 22 AND 23, 1902.

SECOND DAY, MAY 22.

The President introduced Mr. B. E. Chollar, Chief Engineer of the Laclede Gas Light Company, of St. Louis, Mo., who read his paper on

"THE ETHER:" IS IT THE UNIVERSAL FORCE OF GRAVITATION?

This little paper in itself may be of no special interest to a gas convention; but, since it is an attempt to explain how, in a purely mechanical way, light and its cognates may be transmitted, it will do no harm to put it on record.

In order to discuss this subject intelligently and intelligibly, it is necessary that we have a clear conception of what is meant by the terms matter, mass, energy and force.

Not a few writers on elementary physics confuse by an excess of premature definition. For instance: To say, "Matter is the inert constituent of substance," may be clear to the writer, but it is smoke to the reader. It is better to say force moves matter, than to say force is that which moves matter. The latter is an attempt at definition, while the former is not. If we can do no better than define without defining, we had better not define at all. To try to define the indefinable is as bad as to attempt to prove an axiom.

Our first ideas of physical functions are hardest to comprehend, and we get them by continual contact rather than by categorical limitation. None of us may be able to express to another the meaning of the term matter; yet we know by intuition what the word implies.

Mass is a quantity of matter small enough to be measured in finite terms. Mass and weight are alike, yet different. If there were but one mass there would be no weight. When we swing a heavy gate, we deal with mass; if the gate falls off its hinges and we attempt to pick it up, we deal with weight.

Force is undefined and undefinable; its origin is unknown and unknowable. It has no motion nor substantial existence, yet its effect extends to the confines of space. Its name implies its meaning. It causes, it acts, it drives, it pushes, it pulls.

Force is a function of matter, and matter is a function of force; but whether force exudes from matter or matter is condensed force is not for us to know.

Energy is the result of the action of force upon mass. It implies motion; motion implies time. Therefore, to complete our conception of the term energy, we require force, mass and time.

By Newton's great law of universal gravitation we understand that every particle in the universe attracts every other particle with a force proportional to its mass and distance, no matter how great the distance, or whether the intervening space is occupied or unoccupied. In other words, each and every atom is surrounded by a field of force, gradually diminishing in strength, but extending to the limits of the universe.

Space, therefore, is filled with an infinity of force-fields, each one emanating from a particular atom and acting in its own individual capacity, eccentric and intersecting each other everywhere in an infinity of nodes and loops, balancing an infinity of tensions and stresses in an interminable but harmonious tangle.

This condition is universal and eternal. It seems to satisfy the requirements of what we understand as "The ether." It is all pervading, infinitely elastic, without mass, not atomic or granular; jelly-like, and should transmit the force-component of vibratory energy in all directions by action of waves and their harmonics, lateral, longitudinal, of lengths in millionths of millimeters and millions of miles.

We may, therefore, regard the ether as the universal force of the gravitation of individual atoms.

We know by experience, independent of Newton's law, that the earth is surrounded by a concentric field of force acting toward a common point. It may, therefore, be considered in a sense as a single gigantic atom.

We know also, by an axiomatic law of mechanics, that a body will move in the direction of least resistance; or, what is the same thing, in the direction of the greater force.

Since force of the gravitation decreases outwardly from the earth, the lower part of a body must be in a denser field of force than the upper, and if unsupported will take the direction of the least resistance—

that is to say, towards the earth's center, and with increasing acceleration.

The inferences from the foregoing are: That the ether is the universal force of the gravitation of atoms acting individually, and that gravitation is the same force acting collectively.

Discussion.

The President—I don't know whether it is fair or not to put a paper like that before us in hot weather. However, it undoubtedly holds a good deal of thought for us all. I have no doubt that one-half of you have fully made up your minds to agree entirely with Mr. Chollar's position, and that the other half have equally made up their minds to totally disagree with him. I would like to ask Mr. Miller to say whether he agrees or disagrees; and if so, *why* so. (Laughter.)

Mr. Miller—I have in mind a little incident that occurred in Dallas, Tex., the other day. The rector of one of our Episcopal churches has been running a school, and his greatest hobby is the use of good language—he is an Englishman. Some days before I started to attend this meeting he came out in an article in one of our papers in which he discussed a subject of pubic interest. In the course of the article he used the term "dynamic force." He is a man who is very combative in his disposition, as most Englishmen are. Meeting him on the street I said: "Mr. Stucke, I have always had great pleasure in reading your writings and in listening to your discourses, because of the excellent English I always find in them. In fact I have not been able to find anything in your sermons or writings that I could say was not choice English, but this time I want to ask you what you meant in that article that appeared in the paper the other day, by the expression 'dynamic force.' Don't you think that was a little bit redundant?" He said: "Well, now, since you mention it, of course, that is a very proper criticism. I never gave the thing any special thought before, but as I am inclined to think you are right about it I will not use the term any more." (Laughter.) And that's the way it is with me over Mr. Chollar's paper. I never gave the thing any thought before, but I think he is entirely right about it. (Laughter.)

The President—For the other side of the question I think Mr. Ferrier can answer.

Mr. Ferrier—I am also reminded of a story (laughter) that concerned an old Scotchman, who was very eloquent in his appreciation of a certain preacher. This particular time the party with whom he was talking remarked: "What do you say about that sermon the other day? I couldn't make head or tail out of it. Did you make any sense out of it?" He said: "What I admired in the sermon was the use of that blessed word 'Mesopotawmia.'" (Laughter.) Now, I will just thank Mr. Chollar for bringing this before us. Having gone home, and after we get his paper in print, we can find out the use of the word "Mesopotawmia," and discuss it some other time.

The President—If any of you have thoughts suggested by the paper we would like to hear them. I am sorry Mr. Dunbar isn't here. The other night, when discussing the question of waves of light, he presented the idea that if light goes in waves, why is it, when two waves come in exactly the right tune, they don't neutralize each other, like two currents of electricity coming from both ends of a wire? He said it was possible for a man to put so much light in a room that the waves would neutralize each other and cause utter darkness (laughter).

On motion of Mr. Jenkins a vote of thanks was passed to Mr. Chollar for his paper.

The President introduced Mr. Frederick Egner, of Morristown, N. J., who read the following paper, entitled,

GLEANINGS FROM ABROAD: INCLUDING THE LATEST ABOUT INCLINED RETORTS.

Five years is a long time in this progressive age, and it is now 5 years since the writer crossed the Atlantic Ocean—as he did again quite recently—with the same object in view, viz., to see what improvements had been made in the inclined retort system for the manufacture of coal gas. The results of my former trip were made known at the last Cincinnati meeting of the Western Gas Association; and believing that sufficient time had elapsed to make another statement of the same subject interesting, it is herewith submitted.

On starting upon this journey my first intention was to visit nearly every works where inclined retorts were used, but after going to a number of successful works this idea was abandoned, as it seemed to be a sinful waste of time and money.

The operations were so much alike at each plant inspected, so far as the work of the inclined retorts was concerned, and also considering that the number of inclined retort works had increased from a comparatively few to 76 with 8,087 retorts in setting, with an estimated *daily capacity* of over 106,150,000 cubic feet, that the point above mentioned may be seen to have been well taken. For the figures just given the writer is indebted to Mr. Walter King, Editor of the *Journal of Gas Lighting, Water Supply, etc.*, London, England, in addition to other courtesies shown, for which it is my desire to again thank him herein.

"If they believe not Moses and the Prophets, neither will they believe though one were raised from the dead and sent to them," is recorded in a notable parable; and so here. If you do not believe the well authenticated reports, papers and other disinterested statements which have come before you in one way or another, on the part of men who have operated the inclined retorts, or have made them the subject of special study, then all further argument must appear useless. Incredible though it must seem to the gas world abroad, we on this side of the water will deliberately, year after year, and stubbornly, refuse to avail ourselves of such a simple, though notable improvement, which is so clearly a saving of hard work and not inconsiderable expense, amounting to from 20 to 60 per cent. of the cost of manufacturing labor.

The unexplainable obtuseness of the gas industry in general on this side of the Atlantic to promptly take advantage of such a self-evident improvement has at last caused some of our trans-Atlantic friends to believe that they have made a remarkable discovery by the successful solution of the inclined retort system. While fully aware of its extreme simplicity, they have almost, as a rule, become of one mind in that it has at last become exceedingly difficult to obtain the least information as to details of construction concerning the inclined retort bench. The sum of $2,500 has been asked for a set of blue prints showing details of construction which, 7 years ago, would have been obligingly handed to the inquiring stranger gas engineer from foreign parts. The anxious and serious investigations of American gas engineers, visiting Europe by the dozen almost, to look up the inclined retort system, and after becoming *converted to its utility* finally adopting it, must have given our European fellow craftsmen a curious conception of conditions of things gaseous in America, notwithstanding that the successful evolution of water gas, beginning to be commonly used in Europe only now, had its rise in America.

The writer was extremely well received and treated on all occasions, by the British and Continental gas engineers, whom it was his good fortune to meet on his trips abroad.

He saw numbers of fine gas works, many real novelties and examples of good management in Europe as well as in America, but he cannot admit that we are one little bit behind them in anything whatsoever, saving and alone—excuse my repeating it—the adoption of such a self evident labor and money saver (a thing of interest to the working man and capitalists alike) as is the inclined retort system. Englishmen cannot understand it, and some of them who are men of much experience in the subject have come over to the United States to see if they can do business with us in that line; just as Messrs. Humphreys & Glasgow did, by the introduction of water gas in Europe. For one thing, our people have regarded the inclined retort too much in the light of a specialty, when in fact it is nothing of the sort, although a number of patents have been granted for various portions of the improvement.

Having been asked many questions in the past about inclined retorts let me now ask you in general one or two.

Why in the name of common sense should not retorts be set in a suitable oven at an angle of 32° from the horizontal, which is the best adapted for successful working with the system under consideration? Will not the retorts, if thus set, have a tendency to slide into the fire room? Of course they will, if you do not provide against that contingency!

They do *not* slide if properly braced, and if the writer had not given way with his opinion to that of his then President, and to the *then* agent of the manufacturing company that furnished the benches without knowing anything about them, the first large installation of inclined retorts in the United States would have been a success instead of, as it was, a failure 12 years ago. That omission had nothing to do with the underlying principle of the inclined retort. Why should not the inclined retort be evenly heated? Well, have you never seen horizontal retorts which were not evenly heated? The writer has seen lots of them. And it is the same with the inclined retort. Given a properly designed bench, and experienced or sensible management, there is no difference between horizontal and inclined retort benches in that respect. Let me ask you, and you ask yourself, *why* should there be any difference? Is there really any good reason for one? The writer knows of not one; and he has had quite a respectable lot of practical experience with coal gas works, great and small.

"The whole secret of the successful working of any bench is the heats." This was said to the writer only a few weeks ago by Mr. James Husband, Engineer and Manager of the Brentford (England) Gas Company, when again visiting at one of the large works under his management, after having been there 5 years before.

There is probably no more successful manager of gas works anywhere than Mr. Husband. He succeeded Mr. Frank Morris, whose assistant he had been for years, and who himself is still one of the Board of Managers of the Company named. The latter introduced the system at the Company's works, and was afterwards thanked by his Board of Directors for the economies in production brought about by the same, which vote of thanks is a matter of record.

At the works named they have only inclined retorts, 48 benches of 6's and 26 of 7's. The retorts are 20 feet long, D-shape, tapering 21 by 16 inches at the upper, and 24 by 16 inches at the lower end. The producer furnace is about 2 feet 6 inches by 5 feet, at the grate surface. The charges are run for 6 hours, the weight per charge being 700 pounds per retort. In part consequence of this Mr. Husband seldom, if ever has any stopped standpipes.

Four men did all the work of charging and discharging 8 benches. Of course, the coal was brought in by machinery and the coke hauled away in wagons. The working space in front and back of benches was not abnormal, though retort house and coke yard are under one roof. These men seemed to be not overworked by any means, and Mr. Husband remarked that the independence from labor troubles alone would more than compensate one to employ the system, even if there were no saving in other directions; but this there was.

The works in charge of Mr. Husband have the Humphreys & Glasgow, the Economical Gas Apparatus Construction Company, and a British Company's water gas apparatus, but for coal gas manufacturing purposes only inclined retorts; also, works with and without coke-saving machinery. At the latter they sell 1,232 lbs. of coke per ton of coal (2,240 lbs.) carbonized, but with the coke conveyors only about 1,008 lbs., and they have more breeze which they do not so much care for. When so many are doing well it would seem unfair to particularize, and, besides, the paper might become tedious, therefore, only a few more examples will be mentioned.

The Edinburgh and Leith Gas Corporation have, through their able Engineer and Manager, Mr. R. W. Herring, just about completed a model gas works at a suburb of the cities named, viz., at Granton.

There they have 56 benches of 9's, the retorts being 20 feet long, D-shape, 22 by 15 inches in section. One of the features of these works is a novel charging device, the invention of Mr. Herring. By means of it it is no exaggeration to state that, after the charging chute is set before the retort, a child of 6 could place a charge of 600 to 800 lbs. of coal into a retort inside of 5 seconds, the charge being as even and level as it would be possible to put it into a horizontal retort, with the most experienced hand labor.

The Corporation have other works, in each of which they have a few benches of inclined retorts and a great many retorts served by stoking machinery, but the new works as started is supplied with inclined retorts only, after carefully conducted trials by men experienced in the handling of stoking—and the best at that—machinery; disinterested men, who could, however, not afford to make a mistake when building the new works mentioned.

Almost the same remarks would apply to the Corporation works at the city of Leeds, England, where there are three works all of considerable magnitude, only they have as yet no water gas, as they have at Edinburgh, of the Humphreys and Glasgow type which gives general satisfaction. But they are about to install some apparatus of the kind also at Leeds. Water gas in England and elsewhere in Europe is employed mostly for enriching purposes, and as a safeguard in labor disturbances, of which they have had their share. The high price of oil acts as a stopper on the use of water gas in Europe, except for the purposes stated to date.

Mr. R. H. Townsley, the General Manager of the Leeds Gas Corporation, has introduced a very efficient method of leasing or renting gas cookers with penny-in-the-slot meters, of which more might be said at this time, but for my desire to shorten this paper as much as possible. He is popularizing the use of gas among the working population with great success; and as Leeds is a city of over 400,000 inhabitants, he finds it necessary to erect a new retort house which will be furnished with inclined retort benches. They have now the Foulis and the West stoking machinery, and inclined retorts, and one works with inclined retorts only. At these works the coke handling apparatus seemed to be as near perfection as such may be expected to come to; but it was no unmixed blessing, as Mr. Townsley kindly explained.

The most all-around interesting gas works ever seen by the writer was the Crystal Palace District station of the South Metropolitan Gas Company, of London. Mr. George Livesey is the presiding genius of the Company, while Mr. Sydney Y. Shoubridge is the very efficient Engineer in immediate charge of that work and district. Here they have inclined and horizontal retorts, with West's stoking machines, water gas, sulphate works, complete shops for making and repairing meters and gas stoves, machine shops and foundry, and a *brickyard*. They are building a new retort house for inclined retorts, with brick made by the otherwise idle retort house stokers from clay dug from what is going to be a new gasholder tank, which the Company proposes to erect next year, maybe. The brick making machinery is driven by a gas engine, and as there is a great outside demand for the quality of brick made by Mr. Shoubridge, they sell all they can turn out and do not require themselves, at a net profit of 10 shillings per 1,000. They make red and yellow brick, and also all the firebrick, blocks and tiles they need. An old, disused horizontal retort stack of arches has been converted into very good brick kilns. They have not yet essayed the making of retorts, but Mr. Shoubridge seriously thinks of doing it. The block and firebrick made on the works will bear comparison with those made and obtained through the regular channels from elsewhere. Another novelty seen there was a pressure regulating valve, the invention of the foreman of the shops. This valve does absolutely and accurately hold the pressure at any point for which it is set, from a few tenths water pressure up; while the initial pressure may vary, and rapidly, too, from the low point desired to 100 pounds or 180 pounds per square inch. This the writer has seen tested on the spot, and it seems to be quite simple and inexpensive in construction. Its application to high pressure gas mains, where a reduction afterward to a very low pressure service main is desired, seems easy.

Among all the gas works in England where the inclined retort system has been adopted, there is one in the Old Kent Road works of the South Metropolitan Gas Company, which is to be re-converted to the horizontal retort system. This fact will no doubt be made much of by those whose interest makes them opponents of the inclined system, but let me assure you all that the reason of this re-conversion is not at all one of greater supposed utility of the one over the other system, but is done entirely as a matter of shrewd business policy of merely local application. The full reasons were explained to the writer. But as the above statement covers the facts in the case, and as to the policy—the reasons being local only and not intended by the author for present publication at least—we must let it go at that for the present.

At the Crystal Palace District station 8 men attend to 10 benches of 7's, and Mr. Shoubridge stated that the same men could attend to 15 such benches.

The retorts are 20 feet long, made in three pieces, with flat "butt" joints, D's in shape, 21 by 16 inches at the upper, and 24 by 16 inches at the lower end. They charge 700 pounds of coal every 6 hours per retort, and the heats are very even and good.

Six hour charging seems to be a general rule in England as also on the Continent. While they do not force heats as we do, and consequently do not suffer from stopped ascension pipes in the same degree as many in this country do, it is still a debatable question as to which is the best practice. In my own mind the opinion prevails that we err on the high as the European engineers do on the extreme low degree of heats.

It may be as well to say a few words on the questions which have been frequently asked: What of the cost of erecting, maintaining and repairing of inclined as compared with horizontal retorts?

Here again let me appeal to you to your own good common sense, first calling attention to the fact that as *one bench* of inclined retorts is about the same as would be *two benches* of horizontal retorts back to back, this should be borne in mind when making such comparisons. Then, why should such a bench of inclined retorts cost more? There will be one hydraulic main, one set of ascension pipes and one furnace less than would be the case with the horizontals of equal approximate capacity. The bench will be higher, but also much shorter for a like length of retorts. And why should not retorts which are not subjected to the pounding and abrasion of drawing rakes and scoops last longer and cost less for repairs than do horizontal retorts which are subjected to these disadvantages. The claims made by those who are using inclined retorts, that they cost less for repairs than horizontals, must appeal to your own reasoning powers as being likely to be substantiated in fact. If your works are not large enough to warrant elevated coal bins and machinery, you can rig up a barrow walk and platform instead, and then anybody able to roll a wheelbarrow with coal can charge the retorts, so that the expense of charging apparatus may be eliminated if you like.

Having finished the reading of the paper proper, Mr. Egner furnished the following addition to it:

Since writing the paper it has been my good fortune to have seen a few more interesting things bearing upon the subject of inclined retorts. Thinking they would prove of general interest they are herewith communicated. At the office of the Gas Light and Coke Company, of London, I was shown a sheet, which is made out weekly in the Chief Engineer's office, and copies sent to the Resident Engineers or Superintendents of the 9 works operated by the Company named. I was much pleased to note that at one of these works (that at Bow Lane), where they operate inclined retorts only, though they also have machine stoked ones, the cost of manufacture of coal gas was 2 and a fraction of a penny less per 1,000 cubic feet than at any of the other works of that great Company. Now, they have had all kinds of stoking machinery for years, and have experienced men to handle them at all of their works; but *that* was the net result, comparing the items of the whole 9 works represented on that sheet, which, by-the-way, was gotten up by the Deputy Chief Engineer of the Company, Mr. T. Goulden, to whom, and to the Chief Engineer, Mr. G. C. Trewby, the writer is indebted for much interesting information and courtesies shown. A penny you will remember is about equivalent to 2 cents. A portion of the saving per 1,000 cubic feet in manufacturing expense was due to the greater saving on account of repairs with the inclined over the horizontal and machine operated retorts This saving approximated to nearly 2 cents per 1,000 cubic feet; but the most interesting paper shown to me was a report by Mr. Goulden, to be laid before his Board, in which that gentleman made an exhaustive comparison on the relative cost of manufacturing gas with inclines and stoking machines. This report was very conservative, and seemed to me to lean heavily to favor stoking machines rather than inclines, so far as estimated cost for everything required was concerned; but in the end, after giving every benefit of the doubt, as one might say, to the stoking machines, and none at all to the inclined retort system, or at least so it appeared to me, it was shown that when cost of buildings, capital invested, in fact, every mentionable item was accounted for, the inclined retort system was shown to be able to carbonize a ton of coal (2,240 pounds) for 4¼d. less than it could be done by means of machine stoked retorts. When it is considered that the Company works about 2,000,000 of tons of coal per year at the 9 works, the saving to be effected will not appear trifling.

In connection with this saving some member may remark that while it may pay very large works, how about small ones? I would like to refer anyone asking such a question to our latest Volume of Proceedings —that embracing the meetings of 1887 to 1891—where about two-thirds down from the top of page 529 will be found the words of our respected fellow member, Mr. John Gimper, who answered such a question most admirably, as far back as 11 years ago; and I will only say now that it was in favor of the inclined retort system.

At the Bow Lane works they used 2 cwt. of coke per ton of coal carbonized; that is, 10 pounds of coke per 100 pounds of coal carbonized, in other words. The benches are somewhat peculiar in this that they are 8's, set in pairs above each other, the same as we set 6's, but are all inclines. It allows a narrower arch, but goes up a little higher. The Kensal Green plant of the same Company was also visited, and there the work is about the same as at Bow Lane. It was at these works where a notable failure of the inclined retorts took place 11 years ago. But they are quite successful now. However, I have seen inclined retort houses which are quite superior to either of these, in appearance at least, if not in results. As to the latter, I doubt if anyone else does better. I want to say just a few words now about the relative merits of the German and English style of inclined retort settings and accompanying apparatus, because I have repeatedly asserted the superiority of the latter. On very good authority I am informed that at Milan, where they had the German settings and machinery, these are now being removed and replaced by the English style, represented by Mr. Maurice Graham, of Graham, Morton & Co., Leeds, England. Comment seems superfluous. Such facts speak volumes without enlarging upon them.

Finally, please take note that to Mr. A. H. Barret, Engineer of the Louisville (Ky.) Gas Company, belongs the credit of having erected the first successful installation upon a large scale of the inclined retorts in America, built after he had been to Europe and had seen them there. Mr. Walsh, Mr. Taylor, Mr. S. Newman, Mr. Thomas G. Lansden and Mr. John Gimper should also be held in honorable remembrance in connection with the subject, as pioneers in what was 12 years ago as yet an undeveloped art; and was before Mr. Barret made his investigations. But the history of the inclined retort in America would be incomplete without mentioning Mr. James Green, of St. Louis, who expended time and many thousands of dollars to introduce the inclined retorts in America, when no one else, and for years afterward, would spend one cent upon the subject, and who was really the first to recognize the merit of the system. And, finally, gentlemen, please note that it was only members of the Western Gas Association, not forgetting our former Mr. Pratt, of Chicago, who were active to bring out the inclined retort, until, as a matter of fact, they became, so-to-speak, common property, and had to be noticed.

Discussion.

The President—You have heard Mr. Egner's paper, and it is now before you for discussion. I will not call anyone in particular, because I am not familiar enough with the work of the members in this line to know whom to call on.

Mr. Thwing—I would like to ask Mr. Egner whether his short residence in England accounts for his spelling "laborer" with a "u"?

Mr. Egner—It is not. I am an old-fashioned speller, and that's the reason why. But I partly expected to be called upon to explain why I said "harf" and "cawnt." Being a Dutchman anyhow, some allowance might be made for me, but it doesn't make much difference. You will kindly excuse me on account of that I hope. If I am permitted, I will give here a few additional items which may be of interest to the members. At the Bow Lane and the Kensal Green works they use about 2 cwt. of coke per ton of coal, which is 10 pounds of coke per 100 pounds carbonized. They sold 10.69 cwt. of coke per ton. That is 1,197.28 pounds; and used 224 pounds, and therefore they made, exclusive of breeze, 1,421.28 pounds of coke, and from that we get 15.76 of the coke used in benches with inclined retorts only. They charge about 6¼ cwt., or 700 pounds of coal per charge. That would be 2,800 pounds in 24 hours per retort. The average make was something like 4.68 cubic feet per pound of coal, and that brings up the make to 104,912 cubic feet per bench. They worked in 8-hour shifts. Eight men were required to attend to 18 benches, and thus working in 8-hour shifts, they make 78,517 cubic feet of gas per man. If they had worked in 12-hour shifts, as we do, it would have been 118,026.

On motion a vote of thanks was tendered to Mr. Egner for his paper.

The President—The time at our disposal is very limited, so that I will call for the reading of Mr. Nutting's paper on "Gas Engines" by title only. It is rather on the line of a reference paper anyhow. The suggestion was agreed to and the paper was read by title by Mr. F. H. Shelton. The text of the paper by C. H. Nutting, of Chicopee, Mass, on

GAS ENGINES,

is as follows:

I have been asked to read a paper on gas engines at this meeting, and while no doubt there are many here who could write a better paper, I am willing to do what I can and hope that I may make you see the great advantage to gas companies by getting all the gas engines possible connected to your mains.

The gas engine is practically a modern machine, dating from about 1870, when it was improved so as to make a commercial success. The gas engine of the present day can be used for any purpose where power is wanted and can be depended on with as much reliability as any steam engine. The day is gone when the gas engine was thought of only as an experiment or as a plaything, and it has come to stay. It is also a very economical power, and its adaptability to all uses is becoming better known every day. For the lighting of large stores and office buildings by electricity, and generating the current by power derived from a gas engine, it is becoming quite popular and is a great success. A good gas engine direct connected to a dynamo, or directly belted to a dynamo, will not vary in voltage over 1 per cent. This I have demonstrated myself in several instances. Of course, there are a great many gas engines made that will not keep the voltage within this limit. I am now referring to the hit and miss governor, and not to the throttling type of governor, where it takes a charge of gas at every revolution. It is now a well recognized fact that, for equal light-power, but about one-half the volume of gas consumed in direct lighting will produce the same amount of candle power when used in a gas engine for generating electricity for lighting.

When the mere fact of the cost of gas for direct lighting and its cost for producing the same light by its use in a gas engine to run an electric generator is considered, the difference in favor of electric lighting in preference to direct gas lighting is most apparent.

In *Engineering News* under date of February 27th, 1902, is a very interesting article, showing the comparative economy of gas and electric motors for small powers, which I will here give.

"The gas engine and the electric motor have for many years been in competition with each other for small power installations in towns and cities where gas and electric currents are generally available. Wher-

ever the power is required intermittently, and frequent stopping or starting is necessary, or where the size of the motor required is very small, the electric motor is, of course, by far the better; but where a motor is run steadily all day, the lower cost of operating the gas engine in many cases more than offsets the other advantages of the electric motor.

"An excellent opportunity to compare the economy of the two systems is furnished by the experience of the printing office in which the composition on *Engineering News* is done, and we are able to present the following comparative figures, through the courtesy of its owner and manager, Mr. Charles J. O'Brien.

"Power is used chiefly to run linotype machines and small job presses. At present two motors are in use, a 15-horse power gas engine and a 25-horse power Crocker-Wheeler electric motor, the latter installed some time in 1901. The average load carried is only about 10-horse power, but occasionally a much heavier load is thrown on, necessitating a large capacity motor. City illuminating gas is used, costing $1.05 per 1,000 cubic feet. Electric current is taken from the Edison mains, and the price is 10 cents per electric horse power hour, subject to a discount of 50 per cent. and 5 per cent, making the net price 4.75 cents per horse power hour."

A comparison has been made between the two months, Oetober 9 to December 11, 1900, when the gas engine alone was used, and the two months, October 4 to December 5, 1901, when the electric motor alone was used. The results are summarized in the following table:

Kind of motor	Gas engine.	Electric motor.
Period of use	Oct. 9 to Dec. 11, 1900.	Oct. 4 to Dec. 5, 1901.
Total hours machines were run	697.	686.
Cost of gas or current used	$106.68.	$250.30.
Average cost per hour	15.3 cents.	36.5 cents.

A 20-horse power gas engine that I installed some 2 years ago has not had any repairs done to it whatever, and it has been running constantly 9 hours per day. This engine runs a carpenter shop which contains sanding machines, moulding machines, planers, etc. This engine consumed, from April 1st, 1901, to April 1st, 1902, 312,200 cubic feet of gas, or 26,000 cubic feet per month. The man who owns this engine says he could not hire a man to turn a grindstone for the money it costs to run the engine. As to comparing the cost of the gas engine with the steam engine, I will give the following, which was reported by Mr. William F. Ruwell, Philadelphia, who now operates a 13-horse power gas engine. He formerly used steam at the following cost:

Three months' coal bill, at $24 per month	$72
Boy attendant, 3 months, at $18 per month	54
Hauling ashes, 3 months, at $3 per month	9
	$135

In addition he had boiler inspection, increased insurance and more repairs on boiler and engine than on the gas engine which he afterwards installed. Since using the gas engine, he gives the expense as follows:

Gas used from November 15th to February 12th, 48,600 cubic feet at $1 per 1,000 cubic feet, $48.60. No extra attendant was required, the gas engine having only a few minutes attention a day to clean and oil same.

A 5-horse power gas engine that I installed 2½ years ago has not had a single tap of repairs since it was installed, with the exception of one new tube igniter. For the past 12 months this engine has consumed 181,300 cubic feet of gas, an average of 15,100 cubic feet per month, or 36,260 cubic feet of gas per horse power per year. This engine is doing about its full rated horse power, and is running 10 hours per day.

Another engine, a 3½-horse power, which runs a printing establishment, for 12 months consumed 111,300 cubic feet of gas, an average of 9,275 cubic feet per month, or 31,800 cubic feet of gas per horse power per year. This engine runs a cylinder press, 3 job presses, 2 numbering machines and a 30-inch cutter. Most of these machines are running all the time and 10 hours per day. This engine has had one new set of rings and two new ignition tubes since it was installed 3 years ago, this being all the repairs this engine has needed.

Another engine, a 1-horse power, for 12 months consumed 33,400 cubic feet of gas; an average of 2,783 cubic feet per month. This engine has been in constant use over 3 years in a saloon and is used for compressing air, taking the place of the water pumps. It also runs a bottle washer, and in the summer runs in addition 7 fans. The repairs on this engine have not been $10 for the 3 years.

Another engine, a 20-horse power has consumed 407,600 cubic feet of gas in 12 months, an average of 33,970 cubic feet per month, or 20,380 cubic feet per horse power per year. This engine has been running constantly 10 hours per day, but not always on full load, and it is used for bailing cotton waste, running an elevator and for electric lights. This engine was installed somewhat over a year ago and has needed no repairs to date.

Another engine, a 2-horse power which has been running over 2 years, has consumed in the past 12 months, 80,800 cubic feet of gas, an average of 6,733 cubic feet per month, or 40,400 cubic feet per horse power per year. This engine has worked up to its full capacity 10 hours per day. The repairs on this engine for the whole time it has been in use, amounted to $16.50, and that was for re-boring cylinder and furnishing new piston, as they had let the engine run dry and it had cut the cylinder so that it lost its compression.

I find that the hot tube of an engine will consume about 1,000 cubic feet of gas per month.

The gas engine is slowly but surely coming to the front. Let us go back 5 years and see how many buildings then had gas engines to make light, run elevators, printing presses, machine shops, exhaust fans, blowers for foundries, planing mills, and in fact all kinds of work which is now turned by the gas engine. Most of this has come in the last 5 years. Why is this? Economy first; next, your engine is ready to go at all times, without waiting to raise steam, and when you shut down your expense of running the plant is stopped at once, and not with a boiler full of steam. Then, again, when your gas engine is started, it requires very little care. A gas engine running 10 hours per day can be kept oiled and cleaned by giving it 1 hour per day. Then, again, take the floor space. With a gas engine you have engine and boiler all in one, and with a steam plant you should have engine room, boiler room and coal shed, with a place to dump ashes. Then, again, with a gas engine you have no leaking steam lines, no packing to blow out, and no pumps or injectors to trouble with, while with the steam plant you must have a man to stay with the boiler, shoveling coal and wheeling ashes; you must raise steam to get started and keep it up until stopping time. The gas engine is always ready to go, and when started, and oil cups filled, will run without looking after for at least 5 hours.

The gas engine is slowly but surely becoming better understood, and in time is certain to outdo its rivals. There are several gas engine manufacturers who will guarantee their engines to run on 10,000 B.T.U. per brake horse power per hour. Now, if your gas contains 650 B.T.U. per cubic feet of gas, it will take 16 cubic feet of gas per brake horse power to run your engine.

The average gas consumer cannot be expected to give the subject of gas consumption the consideration necessary to determine the advantages of its use, and the gas company should do it and be able to demonstrate its advantages without loss of time or expense to the consumer, and should have employees who could and would assist the consumer in understanding its uses and advantages.

I have just sold one of our consumers a 10-horse power gas engine with a 7½ kw. dynamo direct connected. This plant will be used for electric lighting in a hotel, for pumping water and to run a cold storage plant.

Now, one word as to the selection of an engine. Don't get a cheap engine and make yourself think you are saving money, for you will not. A *poor* gas engine is the *poorest* piece of machinery you can have around, and because there *are* a great many *poor* engines on the market, which do not do all the work as they should, and which cause backaches, heartaches and bad words, do not think that *all* gas engines are alike.

Our gas company sets separate meters for gas ranges, and we find that our ranges average us 11,000 cubic feet of gas used per year. Now a 1-horse power gas engine is worth 3 ranges to the gas company, a 2-horse power engine is worth 7 ranges, a 3½-horse power is worth 10 ranges, a 5-horse power is worth 16½ ranges and a 20-horse power is worth 37 ranges. This is what I find from actual use, and is not guessed at.

Now, isn't it well worth while to make an earnest effort to get every gas engine possible connected to our mains?

Discussion.

Mr. Shelton—This is an exemplification of the method of reading a paper by abstraction or elimination. Mr. Nutting's paper contains figures of practical value here, which unfortunately we have not time to go into, especially in the absence of the author. However, you will be able to find the paper in the JOURNAL.

On motion of Mr. Jenkins, a vote of thanks was tendered to Mr. Nutting for his paper.

The President—Mr. Shelton has a report sent in by Mr. H. L. Doherty

COMMITTEE ON THE OPERATION OF REGENERATIVE BENCHES,

which will also be read by title.

Mr. Shelton—I regret that lack of time also prevents reading at length this report of the committee on the operation of regenerative furnaces. It is lengthy, covering several pages of typewritten matter, and any discussion of it would lead to much consumption of time that cannot now be given to it. I, therefore, move that the report be read by title, that it appear in our records and be published in the JOURNAL, and that the Committee be continued for the ensuing year, pending further instructions from the Association. [The motion was carried.]

The text of the report is as follows:

This subject was assigned to a committee at your Chicago convention in 1900. There has never been any meeting of the committee, and at the time (May 13th) of my determination to make some sort of a report, it was too late to even attempt to get a meeting of this committee.

The most important point in the operation of a regenerative bench is to obtain the proper proportion of primary and secondary air. Even assuming that you have once obtained this proper proportion and have properly set your regulating dampers, you will not maintain this same relationship between primary and secondary air unless your resistance remains the same; whereas, your resistance in the fire bed is very apt to change with the change in depth of fuel, or in the distribution of fuel, or in the degree of coarseness of the fuel supplied to the furnace. It is, therefore, desirable to have at all times about the same depth of fuel in the furnace, and to have it as evenly distributed as possible. If it is piled high in the front portion of the furnace and low in the back portion of the furnace, it is apt to work a portion of the fuel harder than the other portion, resulting in the formation of clinkers.

I have concluded that it is impossible to obtain any satisfactory results in regulating the dampers for the supply of primary and secondary air by any system of observation, and that to get a proper adjustment it is necessary to analyze the flue gases.

At Denver we have selected the Orsat apparatus as best adapted to this purpose. The whole equipment necessary costs less than $50, and the saving of fuel on 8 or 10 benches should pay for this apparatus and the work involved in analyzing the flue gases in a very few days.

We have obtained most satisfactory results by using solutions recommended by Prof. N. W. Lord, of the Ohio State University, at Columbus, O., and which are as follows:

For CO_2: A 16 per cent. solution of KOH.

For O: An alkaline solution of pyrogallic acid, of 20 grms. to every hundred c.c. of distilled water, and just prior to using this solution it is mixed with its own volume of the 16 per cent. solution of KOH.

For CO: 15 grms. of the red oxide of copper are dissolved in 100 c.c. of concentrated HCl, keeping some bits of metallic copper wire submerged in the solution.

The CO_2 is first absorbed, and the shrinkage of volume noted; the O is then absorbed and the shrinkage of volume again noted; then the CO is absorbed and the skrinkage again noted.

The resultant volume, if the manipulations have been properly made, represents your nitrogen. These volumes are then reduced to weight and stated in percentage of total flue gas.

Results can be partially checked by computing the relationship between total oxygen and the nitrogen. By weight, the relationship should be as 1 is to 3.34.

To obtain total oxygen you must take the sum of all oxygen contained in the form of CO, CO_2 and free oxygen. The theoretical yield of CO_2 should be approximately 21 per cent. by weight, and the more nearly you approach this the greater will be your furnace economy. The quantity of water supplied to your furnace will affect your flue gas analysis, and may also seriously influence your economies. The amount of water supplied to your furnace must be determined experimentally. The only possible object in the use of water is to reduce the temperature in your fuel bed to prevent clinkering and to prevent melting down your arch. As far as I know, it is not customary to take any special precaution to supply the proper amount of water to the furnace, and yet it is important that this should be done. I will first state my recommendation for the supply of water fed to the furnace, and will later state how the quantity should be determined.

The water should be supplied from a source of uniform head to obtain uniform flow. The quantity of water desired may be checked by a regulating valve near the furnace entrance, and at this point the water should be allowed to flow freely through an air space of say 8 inches into a funnel shaped receptacle, from which it will be conducted to the furnace. The quantity of water desired should be reduced to the rate of supply for a minute, and then, by the use of a small measure of known capacity, such as a burette, and a stopwatch, an observation of one minute can be made each day, or for a shorter period, and the flow checked up for accuracy or again regulated to give the amount desired. The easiest way would be to reduce the quantity of water wanted per minute to volume, and then scratch the burette at the right height to indicate when this quantity has been reached.

The supply of water to the furnace, the regulation of air dampers and the general care and manipulation of the furnace, should all be placed in charge of one man, and properly in the hands of the retort house foreman. No one else should be allowed to tamper with the dampers or water valves, and the man in charge should make changes only after proper analyses and observations.

In speaking of half-depth and full-depth benches, there seems to be a misunderstanding of the meaning of these two terms, by different gas engineers. I do not find any clear definition of these two terms, although I have looked through the files of the JOURNALS devoted to gas engineering for fourteen years. I assume this term "depth" simply indicates the depth of the furnace below the nostrils at the base of the combustion chamber, while I had always supposed that the term "half-depth bench" was used to indicate a furnace where the secondary air only was preheated, and that a full-depth bench was one where both primary and secondary air were preheated, and that the depths of these furnaces might be 6 feet or 12 feet, or anything between. The depth below the charging floor does not necessarily mean anything, and if it is intended by stating the depth to indicate the extent of recuperation, it would seem to me much more desirable to state the recuperation direct, in either capacity or square feet of heating surface.

Some two years ago a controversy was in progress among certain English and Continental gas engineers regarding the relative efficiency of full-depth and half-depth benches, and I think the general impression left in the minds of gas engineers was that full-depth benches are not much more economical than a half-depth bench. There is no doubt in my mind but that it would pay us to carry recuperation as far as possible, provided the expense of fuel was high enough to warrant it, and I think generally the price of fuel which now prevails is high enough to warrant more attention being paid to the recovery of heat by further recuperation.

I do not know the proper uses of the words "regeneration" and "recuperation." In other similar industries it is customary to speak of a regenerative furnace as one in which the heat of the flue gases is recovered by direct contact with some heat absorbing substance, and the process is an intermittent one, requiring reversal of the direction of flow of incoming air and outgoing gases. It is customary in these same industries to speak of a furnace where the heat is transmitted to the incoming air from the outgoing flue gases through the walls of flues as recuperator furnaces. It is immaterial, I take it, which term is used; but it would be desirable to have uniformity amongst gas engineers, and also that they should be in conformity with the nomenclature of other engineers. As an indication of the theoretical possibilities of a full-depth bench as compared with a half-depth bench, using no water in the furnace and with recuperation carried to its ultimatum, I set forth the computation which follows. It, of course, would be impossible to obtain full recuperation, although this point could be very closely approached, and especially if iron recuperators were used at the lower temperatures.

Another reason why recuperation cannot be carried to its ultimatum is due to the lower thermal capacity of the air, as compared with the flue gases. If you were to preheat all of the air up to the temperature at which the flue gases enter the recuperators, the air would only contain about 90 per cent. as much heat as your flue gases, even at an equally high temperature. These sources of error are not allowed for.

The following computation shows the theoretical efficiency of a full-depth bench as compared to a half-depth bench, using no water in the furnaces:

For Full-Depth Bench.

Heat Produced.—1 pound C with 2.66 pounds O and 8.88 pounds N to 3.66 pounds CO_2 and 8.88 pounds N.... 14,544 B.T.U.

Losses.—3.66 pounds CO_2 from 60° to 2,500° F. = 3.66 × .2164 × 2,440..... 1,932 B.T.U.

8.88 pounds N from 60° to 2,500° F. = 8.88 × .244 × 2,440..... 5,287 "

Gross loss..... 7,219 "

Recovered by absorption in secondary air, which would be 5.77 × .2379 × 2,440 = 3,349 B.T. U.

The flue gases would have a specific heat of .236, and the temperature of the escaping gases at the bottom of the flues where secondary air is admitted would be

$$2{,}500° - \frac{5.77 \times .2379 \times 2{,}440}{12.54 \times .236} = 1{,}368° = \frac{1{,}795}{2.959} = 1{,}368° - 606° = 762° \text{ F.}$$

Then the net loss of heat = 7,219 — (3,349 × 1,795) = 2,075 B.T.U.

Therefore, the theoretical efficiency of a full-depth bench, not allowing for radiation, opening of doors, etc., would be

$$(14{,}544 - 2{,}075) \div 14{,}544 = 85.73 \text{ per cent.}$$

For a half-depth bench the heat produced and the gross losses are the same as for a full-depth bench, as is also the heat recovered by absorption in the secondary air; but there would be no recovery in the primary air, and, therefore, the net loss for a half-depth bench would be

$$7{,}219 - 3{,}349 = 3{,}870 \text{ B. T. U.}$$

The theoretical efficiency, with previously mentioned omissions, for a half-depth bench would then be

$$(14{,}544 - 3{,}870) \times 14{,}544 = 73.39 \text{ per cent.}$$

In the operation of a full-depth bench where recuperation is carried almost to its limit, the amount of water used should be as little as possible, unless the water is introduced with the ingoing primary air and is carried through the recuperators.

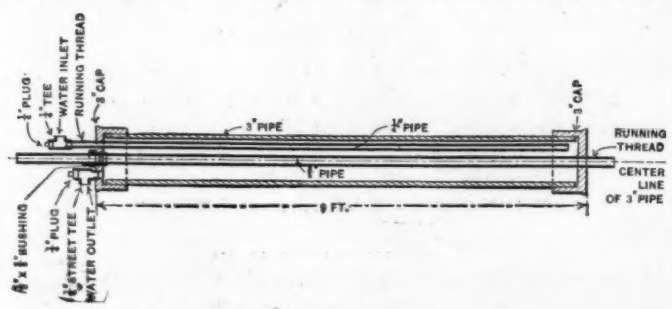
With a half-depth bench you can use as much or as little water as you want, and it will not seriously affect your economy. This is owing to the fact that the more carbon you gasify by the oxygen of water the less primary air you will use and a correspondingly greater amount of secondary air. No matter how much water you use, your air used per pound of carbon burned will remain the same. The use of water does not influence the total amount of air necessary for combustion, but it does lessen the amount of primary air used, and it does increase the amount of secondary air used.

Now it happens that this increase of secondary air enables just about enough more heat to be carried back into the furnace by recuperation to offset the heat expended in raising the water to the boiling point, supplying the latent heat of vaporization and also the amount of heat carried out of the furnace by the sensible heat contained in the water vapor thus discharged. By the liberal use of water in your furnace, providing for its proper distribution, and with a uniform depth of fuel, it should be possible to run your furnace without any clinkering whatever. If 3 pounds of carbon are gasified with oxygen from the air and 1 pound of carbon is gasified with water and no CO_2 is formed in your furnace, the temperature of your furnace should be about 1,182° F. If you use 1 pound of water for every 4 pounds of carbon your temperature should be about 1,700°. With 1 pound of water for every 6 pounds of carbon your temperature should be about 2,025°. And for 1 pound of water for every 8 pounds of carbon your temperature should be about 2,185°. For 1 pound of water with every 10 pounds of carbon your temperature should be about 2,279°, and with no water at all, your temperature should be about 2,643°.

For half-depth benches I would recommend that you try experimentally the use of 1 pound of water for every 5 pounds of carbon. You can vary this to suit local conditions, but with a reasonably good coal and the formation of only a small amount of CO_2 there should be no tendency of your furnace to clinker.

By the analysis of gases at different points in the bench some very satisfactory results should be obtained. These analyses should also be accompanied by temperature measurements. Up to date we have been unable to get any satisfactory measurements of high temperatures, and have had very poor results from the use of fusible cones. The handling of gases above 500° in temperature requires some care, and iron tubes, used even at low temperatures, have been known to change their composition materially.

I incorporate a simple diagram of a water-cooled tube which I have used successfully and which can be made at any gas works. By the use of these water-cooled tubes gases can be drawn from any part of the furnace or from any part of the recuperators. An ordinary gas bag can be used for receiving them, or two tin vessels may be used, which are first filled with water, and by turning a cock at the bottom the water is allowed to run out, drawing the gases in after it. I recommend the use of 2 on a Y-connection, for in this way all air may be excluded. Any water which is used in drawing off gases should be first subjected to the presence of the gas and intimately mixed with it to give the water an opportunity to absorb the gases to its point of saturation. By analyzing flue gases at the entrance of the recuperator flues, and also at the stack, any leaks in the recuperator may be detected by an increase in O and N.



For full-depth recuperator benches, I would recommend just enough water to prevent the ash from clinkering.

I am too busy to promise anything further on this work and I therefore recommend that I be dropped from the committee and that the committee be so organized that this very important work may be carried on. I will assist the committee in any way I can, and if I find it possible to do so, I will make an independent report covering additional work which I have planned, but which will have to be deferred until many other matters which are now of more importance to me shall have been disposed of.

Respectfully submitted,

HENRY L. DOHERTY.

A Letter From Mr. Doherty.

The Secretary read the following letter from Mr. Doherty in connection with the above report:

THE DENVER GAS AND ELECTRIC COMPANY,
DENVER, COL., May 14, 1902.

MR. JAMES W. DUNBAR, Secy. Western Gas Association, New Orleans, La.—Dear Mr. Secretary: I have previously written you personally, but I want to now lay certain matters before your convention.

First: My regrets that I am unable to attend your meeting; and, second, my regret that the National Electric Light convention and the Western Gas convention conflict in dates. I requested the officers of the National Electric Light Association to fix the date of our meeting one week after the Western convention, but by mistake they fixed this date for the same dates as the Western, and the error was not discovered until I was in attendance at the Ohio Gas Light Association. I then attempted to postpone our meeting until June, but found it would be impossible to do this without conflicting with the meeting of the Institute of Electrical Engineers, who had already changed their date once to accommodate dates fixed for our National Electric Light convention.

This conflict of dates would only affect about 14 men who are members of both Associations, and out of this 14 two will attend the National Electric Light convention and 8 of them will attend the Western Gas convention; the other 4 are yet to be heard from; so this conflict will result more seriously to the National Electric Light Association than to the Western Gas Association.

I want to call your attention to a move which was made by the Ohio Gas Light Association, to endeavor to prescribe standard methods for testing fuel gas appliances. If your convention can see its way clear to encourage this work, I know it will result favorably to the entire gas fraternity. The state of development of our fuel gas appliances at present is not very creditable, and the manufacturers cannot be blamed as long as the gas men insist on purchasing appliances purely on consideration of superficial observation and low price.

I am inclosing you my report as a member of the Committee on Operation of Regenerative Furnaces.

In writing this report I have twice attempted to find definitions for certain terms used in gas engineering, and have failed. I, therefore, want to recommend to your Association that a committee be appointed to standardize the terms used in the gas business and to harmonize these terms with the terms used by other engineers.

To make myself more clear I wish it were understood that when they speak of a half-depth bench, they mean a bench where the secondary air only is preheated, and when they speak of a full-depth bench, they mean a bench where both primary and secondary air are preheated.

I would also recommend that recuperators be rated, in either the quantity of heat which they will transmit at certain fixed differences in temperature, or else that they be rated on square feet of heating surface.

I also think it is customary to speak of the transfer of heat through walls of flues as recuperation, and the transfer of heat by contact as regeneration.

I also would like to see the terms used to express candle power in the gas business, harmonize with the terms used in other branches of

engineering. I would like to see the candle power hour adopted as the unit of quantity, and the candle power foot adopted as the unit of intensity.

There are numerous other terms which do not convey to all gas engineers exactly the same meaning, and which are out of accord with other branches of engineering.

If a better name cannot be suggested for this committee, I recommend that it be called "Committee on Nomenclature."

Whatever else you do do, don't put me on this committee, for I have troubles enough of my own, and while I am always glad to serve the Western Gas Association in any way I can, I know that in this particular matter others can serve the Association much better.

Yours truly, HENRY L. DOHERTY.

The Secretary having called attention to the necessity that existed for the prompt procurement of signed certificates in accordance with the agreement between the Association and the railroads respecting transportation, the President called for the

REPORT OF COMMITTEE ON FINAL RESOLUTIONS,

which was read by Mr. William E. Steinwedell, as follows:

Gentlemen of the Western Gas Association: The Committee on Final Resolutions beg leave to offer the following:

Whereas, The members of the Association feel that the meeting has been a most pleasant and profitable one, owing to the exertions of its President, Secretary and Committees of Arrangements, it is but fitting that the appreciation of the members present be shown by

Resolving that the thanks of the Association be tendered them for their successful efforts.

Resolved, That the thanks of the Association be tendered the New Orleans Lighting Company and all of its officers, especially Messrs. F. H. Shelton, Bankson Taylor and Mr. Marshall for their assiduous devotion to the welfare and entertainment of our ladies, our members and the fraternity generally, their courtesies having been seconded by all New Orleans.

Resolved, That the Press of New Orleans generally be thanked for their attendance, their interest in our meetings and the completeness of their reports of our meetings and membership.

Resolved, That the Secretary forward to the aforesaid copies of these resolutions.

FRED. B. WHEELER,
W. A. STEINWEDELL,
ROLLIN NORRIS, } Committee.

On motion of Mr. Thwing the report was adopted.

No further business offering, a motion to adjourn to the following day was adopted.

THIRD DAY, MAY 23.

The third day was pleasurably employed in a 20-mile trip on the Mississippi river, during which voyage many oddities respecting river travel in the far South were observed. The return to the city was accomplished at 4 P.M., and when the members had disembarked from the steamer, the concluding session of the convention was called to order in the ferry house.

The Chairman read the following telegram from Mr. A. H. Barret, acknowledging his election as President:

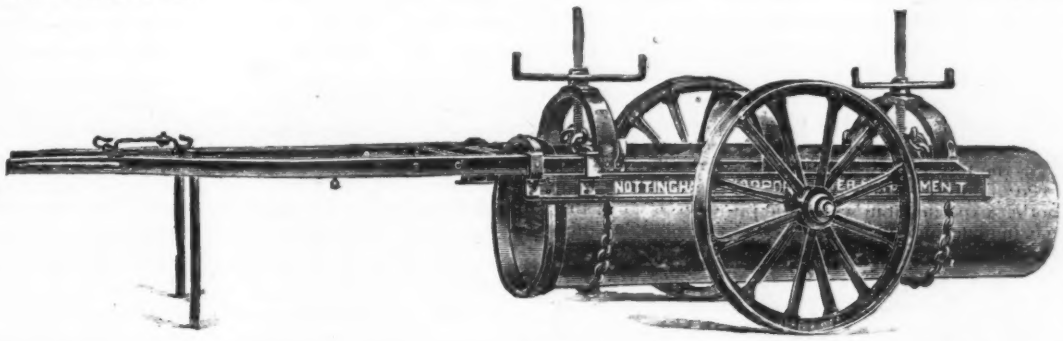
LOUISVILLE, KY., MAY 22, 1902.

THOS. D. MILLER, New St. Charles Hotel, New Orleans, La.—Please express to the Association for me my appreciation of the high honor conferred, and say that it will be my effort to have the next meeting second to none that the Association has ever held.—A. H. BARRET.

The reading of the telegram was followed by a round of cheering, after which the Association passed an especial vote of thanks to Mr. Bankson Taylor, of the New Orleans Lighting Company, for his sustained and successful efforts to entertain the Association and its guests. An outburst of cheering also marked the passage of this resolution. A motion to declare the convention adjourned was then adopted.

The Transport of Large Pipes.

The *Journal of Gas Lighting* notes that long and large water pipe lines and trunk gas mains are continually on the increase; and a vehicle properly constructed and equipped for transporting the bulky pipes used, will be found more and more a necessity of large gas and water supply works. Thomson's patent pipe cart is a new production for the purpose, and it is going to seriously challenge the supremacy for this work of the Junker cart. It is constructed by Messrs. Thomas Danks and Company, Limited, of Nottingham. As the illustration shows, it is remarkably compact; and, needless to say, being made by the firm named, the excellence of the work put into it is vouched for.



The cart is mounted on two wheels. The load being perfectly balanced on the axle, the cart is exceeding mobile, and is easily manipulated and brought into position under different conditions. Excepting the shafts, the cart is constructed throughout of best wrought iron and teel. The wheels are of the well-known type fitted to traction engines, and are specially designed to stand rough usage. The frames and the bridges which carry the lifting screws are of strong channel iron. This gives the maximum of strength, with the minimum of weight. The screws are of special steel, lathe turned, and work in large gun metal nuts. The carts are constructed in two sizes. The first is made to carry 15-inch to 30-inch pipes, ranging from 11 cwt. to 3 tons in weight; and the larger size, to carry 30-inch to 50-inch pipes, ranging from 30 cwt. to 8 tons in weight. One of the great advantages of this new cart is that only one man is required to load it. Its utility has been proved; and there should be a good field open for its adoption.

Wattmeters.

The *Electrical World* notes that a large number of replies were received to queries in the Question Box of the National Electric Light Association relating to wattmeters. Mr. E. J. Bechtel, of Toledo, O., considered that induction type meters are preferable to the commutator type under most conditions, and especially so in residences or where light loads are frequently used for long hour burning, and heavy loads are demanded at times. The induction type of meter requires less attention and inspection, and a good form is more reliable on constant potential or other low power factor loads. Mr. J. E. Barker, of El Paso, Tex., said that the induction meter has the same advantage over the commutator meter that the induction motor has over the commutator motor, in that there are no brushes to spark on the commutator or get out of place. Moreover, the meters are easier to clean and repair, and repair parts are cheaper.

Mr. E. H. Jenkins, of San Antonio, Tex., favored the induction meter for the reason that there are fewer chances of the meter stopping; it can be made just as accurate as the other type, and the moving parts are lighter. Mr. George R. Greene, of Philadelphia, considered that the commutator type meter, when properly compensated, registers with commercial accuracy equally well on both direct and alternating circuits of the usual frequency, and also on inductive and non-inductive loads. Recent improvements have tended greatly to reduce disadvantages due to commutator and brush troubles and to the trouble with jewels incident to the relatively heavy rotating parts. The disadvantages of the induction meter are that it is applicable to alternating currents only and must be adjusted to any large difference in frequency. Its general advantages over the commutator meter are: Absence of commutator and brush troubles; reduced jewel troubles, due to lightness of moving

parts; saving in shunt losses, these losses being one-third or less than in the case of the commutator meters; they can usually be repaired more easily and quickly, require less repairs and the costs of repair parts are less; they are more sensitive on light loads and remain calibrated longer. Mr. Greene stated that his Company uses the commutator type meter on all direct current circuits, and is now installing an induction type of meter on all alternating current circuits.

Mr. F. P. Cox, of the General Electric Company, considers that in those stations where meters can receive but little attention, and where inspection and adjustment cannot be made, it is probable that the greater revenue will result from the use of induction meters. The disadvantages of induction meters are that their curve does not approximate a straight line law as closely as that of a meter of the commutating type; they are particularly susceptible to changes in wave form; they are at a disadvantage with the commutating meter because they cannot also be used with direct currents; they are unquestionably subject to ageing, which ultimately affects the light load accuracy; the induction meter must be looked upon as a device not yet thoroughly established, while this is not true of commutating meters. Finally, induction meters as a class may be designated as "low torque" meters, and as such are liable to greater changes in accuracy. Mr. Cox believes that a discussion of the relative merits of induction and commutator currents will of necessity center on a discussion of torque.

Mr. O. J. Bushnell, of the Chicago Edison Company, stated that the advantages of the induction type meter are that they are more accurate on light and inductive loads, they have lighter moving parts and consequently less wear of jewels, and with no increasing friction due to brush contacts. Commutator meters have the advantage of stronger torque. Mr. J. H. Perkins, of Youngstown, O., enumerated the advantages of commutator type meters, as consisting in greater independence of frequency and their applicability to both direct and alternating current circuits. The advantages of the induction type meter are that they are dust proof and are more accurate on light loads, both when new and after use; there is no commutator friction; they will not creep, and in one type manufactured there is no jewel bearing to give rise to inaccuracy. Upon the whole, Mr. Perkins considers, after one year's use of induction meters, that they show far better results than the commutator meter on every point except those noted in connection with the latter, and these are of small importance when compared with the general advantages of the induction meter.

On the subject of locating a meter on the consumer's premises, Mr. W. T. Oviatt said that a clean, dry place should be chosen, unexposed to vibration or sudden jars, and not more than 8 feet nor less than 4 feet from the floor. The meter should be protected by fuses, and there should be a service switch between the meter and the lights, so that the shunt coil will have current at all times there is current on the line. Mr. Geo. Greene, of Philadelphia, said that the meter should, if possible, be located on the lower floors of the buildings and in a position accessible at all reasonable times for reading and testing. Small closets, bathrooms, kitchens and damp, dusty places should be avoided. The meter should never be installed where it will be liable to unusual vibration. It should be placed about 6 feet above the floor and sufficient room left above and below it for removing the cover and jewel. Mr. O. J. Bushnell, of the Chicago Edison Company, gave advice similar to the above.

Messrs. F. L. Sargeant and W. T. Oviatt favored direct reading dials, the former because of the lessened clerical work, and the latter because there is less liability to mistake in reading and the consumer can read his own meter, thus obviating a great many disputes as to bills. Mr. Geo. R. Greene considered that the direct reading meters thus far placed on the market are subject to the disadvantage that the cylinders are apt to stick; otherwise they are preferable to the index dial type. Mr. O. J. Bushnell, of the Chicago Edison Company, said that the direct current dial is very hard to read, and his Company for this reason prefers the index dial. An anonymous communication criticized direct reading dials, the statement being that they cause more trouble than index meter dials; moreover, direct reading dials have been given a fair trial by both gas and water companies, and have been abandoned.

In answer to a query as to whether it is desirable to do away with all constants on meters, even if the meters cost more, there was a unanimity of opinion on the part of the five central station men who discussed the question, the consensus of opinion being that constants on meters cause more trouble than almost any other feature in the collection department of central stations, and that they should be eliminated. In eliminating constants, however, the value of the dials on larger sized meters need not be changed, as this is almost sure to result in confusion and consequent loss to the Company in some instances.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, June 10th, 1902

For the Novelty Advertising Department.—Troubles in Scotland.—The Price of Coal.

I commence this month with a suggestion for the novelty advertising department attached to some of the American Gas Associations, and that is, to utilize the sides of the coal wagons as used on the railways for purposes of advertisement. Most English gas undertakings find it advantageous to provide their own wagons or to hire the same on repairing terms, and the Malvern Town Council have, in accordance with this custom, purchased 16 railway wagons for use in connection with the gas works. On each side of every wagon is painted in large letters, "Malvern Queen of Health Resorts." The Malvern authorities prefer to advertise their town and district, rather than their gas, but the idea is capable of extension to suit the requirements of gas undertakings. It is difficult to conceive a more prominent and taking position than the side of a railway truck, which possesses an evident advantage over a stationary pitch, however prominent. The only drawback is that the advertisement must be short, and confined to a very few words. There is no reason why the aid of the pictorial artist should not be called in to illustrate the advantages of cooking and heating stoves or of Welsbach lights. Indeed it is surprising that the above is almost the only instance of the sides of railway cars being turned to a useful account. A train of coal trucks as at present finished off is not a very interesting or ornamental object, and the prospect of such being converted into a moving panorama resplendent with color and elegance is indeed entrancing. Joking apart, one might do more than put such legends as "Cooking with Gas," "Gas Light Cheapest and Best," etc., etc., on the sides of the coal wagons.

Some of the Scottish town authorities appear to find that the possession of a gas works, however advantageous in some respects, is not without its drawbacks. For some reason or other municipal ownership has always been more in favor north of the Tweed than elsewhere, and in certain cases, which it would, perhaps, be invidious to mention, has been attended with marked success. But lately there has been quite a chapter of complaints. At Dundee the council are bemoaning a deficiency of £7,000 on the last year's working, instead of the expected balance on the right side. The gas works have been reconstructed, and a large saving in labor was anticipated. But so far as one may judge by the reports in the local papers, this has not been realized, and also there is a deficiency in the yield of gas—10,000 feet per ton of coal carbonized was expected, but only 9,300 feet realized. Evidently this is not the whole of the story by a long way. At Broughty Ferry, a workman, in changing the holder valves at about 10 P.M., turned the wrong valve and stopped off the whole supply of gas for several minutes before the mistake was discovered. It is a weak point in the design, or in the management, when holders have to be changed at 10 P.M. There are several ways in which such a contingency can be avoided. There is also the simple but effective plan of providing a tablet of wood or metal, with a chain and hook, bearing the words, "This tablet must always be hanging on an open outlet valve." When a change is to be made, the second valve is opened, and the tablet moved to it, before the first is closed. A notable feature about the Broughty Ferry incident was the means adopted to prevent further disaster. It was thought that many of the inhabitants had retired to rest, leaving gas burners alight, and that the gas would consequently be escaping. And so the supply was designedly stopped off at 10:30 P.M, and not put on again until 10 A.M. next morning. Such a step may, perhaps, be applicable to the circumstances of the town in question, but in most cases the remedy would be worse than the disease, and it is questionable how far a company, under the usual obligations to maintain a supply of gas, would have power to follow this example. A municipal supply is, to a certain extent, a law to itself, and no ratepayer would care to proceed against it for penalties. But with private companies the case is different, as there are always a few busybodies, or place hunters, willing to earn a cheap notoriety by attacking them.

With the spread of education there is an accompanying spread of ignorance. The apotheosis of the schoolmaster has dispelled the belief in ghosts, witchcraft and the evil eye, but has increased the number of those who, like the Scotch gardener in "Adam Bede," have such a keen insight into matters that a knowledge of facts is superfluous. Gas managers are well acquainted with the type of individual who knows better than his gas meter, even when backed up by the certificate of the official meter inspector, and who, after an immense amount of corres-

pondence and expense, being finally cornered, offers to "compromise" the matter by paying a third of the sum legally proved to be due. One of the principal facts that are beyond the ken of this genus of educated ignorance is that gas is a convenient means of heating and that in cold weather readily applied methods of taking the chill off the air is to light up a few gas burners. Another is that where gas fires are fixed they are used to an extent varying with the climatic conditions. Gas managers know well that a fall of 20° in the thermometer means a rise of 20 per cent. in the consumption of gas, and have also acquainted themselves by practical observation with the explanation, and they know that at the end of the quarter the extra consumption will be in evidence on the bills. The man of keen insight, however, knows better, and so he is always largely in evidence after a spell of cold weather, comparing his gas bill with that for a corresponding period of the year but for a much milder season, and roundly ascribing the increase, not to the chronic and natural cause, but to the dishonesty of the gas company, with special reference to any particular individual official who has been so unfortunate as to offend him. If the meter inspector has not been willing to indorse his arguments, he goes to the manager and couples his complaint with the suggestion that as long as the inspector in question is allowed to occupy a responsible position nothing but dissatisfaction will follow. And if the manager refuses to hear him he appeals to the board of directors, not forgetting to hint that as long as consumers of 30 years' standing are treated as he has been the dividends and property of the company are in a very precarious state. This class of customer has been in evidence at several places after the severe weather of December last, and amongst others at Dundee, where he has been so far successful that a noted authority, Mr. Newbigging, has been called in to investigate his complaints. Mr. Newbigging has not only had the advantage of full information from the officials, but of an interview with the Corporation, the members of which assisted him with various suggestions as to stoves, burners, the possibility of air getting into the pipes, etc. With this assistance, Mr. Newbigging will no doubt be able to deal with the complaints. He is going to sit and take evidence from all consumers who wish to tender the same. But it is easy to prophesy the result of his report. If there is anything to support the keen insight style of argument in it, all right, but if not it will simply be relegated to the position already accorded to the meter inspector, the manager of the gas works, and the official examiner. The views of the keen insight man are so far away from ordinary common sense and reason that compromise is impossible. His first axiom is that the meter is 400 or 500 per cent. fast. If he would only vary the story by imagining his meter too slow, it might be possible to satisfy him.

The price of coal has been a very serious factor to reckon with during the last 2 years, the ruling prices having ranged 20 to 30 per cent. above the average, and been such as to upset all ordinary financial calculations and to necessitate an increase in the price of gas. The important matter of renewing coal contracts is therefore taken up this season with more than ordinary interest. The usual custom is to enter upon 12 months' contracts at or about midsummer, not only the price but also the quantities for each month being specified and there is every reason to believe that the terms for new contracts will be favorable to gas undertakings, and will run on the lines of a return to the prices of 1898 and 1899. The advent of cheap gas stoves and also of cheap incandescent burners has created a very active demand for gas, and most gas companies are fully engaged in laying on new services, etc. In fact, it is rather a question of how much capital they care to embark in services, meters and stoves. Perhaps the connection between these two points is not very clear at first sight. A high coal bill meant less profit, and profits are regarded in financial circles as an indication of the progress of business. Many managers of gas works when asking for more capital were met with the reply that they could not earn full dividends on that already existing. The result is that valuable opportunities for extending business have been lost for want of capital. The advent of cheaper coal has an influence beyond that of the immediate effect on the current finance. It will, on the average, mean greater activity in extending business. Many will now feel warranted in asking for a grant of £1,000 to spend on cooking stoves for hire where they would have felt that it was useless to ask for £200.

The same applies to enterprise in other branches such as the maintenance of incandescent burners. So that the remainder of the year will witness a more active policy in the way of extending business. One factor that should not be overlooked is the declaration of peace in South Africa. The chief burden of maintaining that prolonged and costly struggle has as usual fallen upon the middle or business class. The wealthy land and property owners can command influence in Parliament, and no government would dare to tax the wage earning classes to any extent. The average commercial man, disheartened by heavy taxes, has not been in an enterprising humor. But now there is a prospect of returning to normal conditions of things, there will be a more cheerful and hopeful feeling that will greatly assist progress.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. H. L. RICE, who has been Superintendent of the City Gas Company, of Norfolk, Va., for several years, has been appointed Manager to the Company. Mr. W. E. Hartman, of Port Huron, Mich., succeeds Mr. Rice as Superintendent.

SOME days ago at a special meeting of the shareholders in the Beaver Falls (Pa.) Gas Company, it was voted to merge its interests with those of the County Fuel Company, the corporate name of the new concern to be that of the County Light and Fuel Company. The manufacture of artificial gas is to be discontinued, and natural gas will hereafter be exclusively supplied in the Beaver Falls district for lighting and fuel purposes. The officers of the new Company are as follows: President, Chas. M. Merrick; Treasurer, F. G. Barker; Secretary, John T. Reaves; Manager, Jno. Critchlow.

MR. CHARLES R. LINDSAY, JR., writing to the JOURNAL, from Chicago, under date of the 20th inst., says that he has resigned the position of Manager of the Chicago Welsbach Company, and has formed the firm of Lindsay & Company, which concern proposes to undertake the business of the manufacture of incandescent mantles on a large scale. The headquarters of the Company are in the premises No. 170 Lake street, Chicago. The Company will carry a complete line of incandescent gas supplies, and will represent the Manhattan Brass Company in the States west and southwest of New York and Pennsylvania.

THE lighting situation in Denver, and the standing of the Denver (Col.) Gas and Electric Company in connection therewith, seem to have been very much simplified in the purchase by the Denver Gas and Electric Company of a controlling interest in the Lacombe Electric Company.

THE Altoona (Pa.) *Gazette* of the 20th inst. reports that ground for the foundations of the new opposition gas plant for that city, to be owned and operated under the title of the Mountain City Gas Company, was broken that day. The proprietors of the Company seem to have plenty of assurance, for up to the 20th inst., the city authorities had not passed an ordinance giving them the right to pipe the streets. The officers of the concern are: President, F. P. Allen, of New York city; Treasurer, Frank Hastings, of Altoona; Solicitor, W. S. Hammond.

THE proprietors of the Equitable Gas Light Company, of Memphis, Tenn., have determined to use oil from the Beaumont field in their generating apparatus.

WM. CLEMENT and others are proposing to construct an opposition gas plant in Freeport, Ills. There is little likelihood, however, that the authorities will grant the necessary franchise.

THE Milwaukee (Wis.) Gas Company has closed a contract with the Western Gas Construction Company, of Fort Wayne, Ind., for a duplicate water gas set of the Construction Company's high carburetor and divided blast design. The capacity of the apparatus is rated to 2,000,000 cubic feet per diem. The contract also calls for the placing of a set of 6 purifying boxes, of the Construction Company's duplex type. The boxes are arranged for working under the Chollar system of reversal of flow of gas for revivification *in situ*.

THE proprietors of the Madison (Wis.) Gas Company have awarded a contract to the United Gas Improvement Company for the construction of duplicate water gas sets of its well-known standard type. The total capacity per day of the sets is not less than 1,000,000 cubic feet.

THE New Haven (Conn.) Gas Company has decided not to extend its mains to the adjacent summer resort of Cosey Beach this season.

WE understand that Mr. Walter Scribner, of Logansport, Ind., has been appointed Manager of the Belleville (Ills.) Gas and Electric Light Company, vice Mr. B. F. Sands, resigned.

On the 3d prox., Messrs. S. E. Jones, John J. Gough and Chas. E. Stewart will apply to the Governor of Pennsylvania for license to incorporate the West Hazelton Gas Company, the purpose of which is to manufacture and supply gas for lighting and heating in West Hazelton and the adjoining territory.

In his report to the City Light Department, of Richmond, Va., concerning the operations of the Richmond municipal gas works for the past year, Superintendent Knowles remarked, among other things: "During the period of 30 years, beginning 1867 and ending 1896, the gas works of the city paid into the City Treasurer the sum of $1,174,855.29 over and above the amount drawn out for cost of running the works and producing the gas. This amount exceeds the total of the construction and extension accounts for 30 years by $527,283.57 and, deducting the cost of the plant, previous to 1867, say, $391,377.26, the works, besides paying back to the city its entire outlay for grounds, buildings, plant, pipe, and all other appurtenances, has a surplus to its credit of $135,906.31. This must be still further increased by difference between the value of the gas furnished the city for public consumption and the interest allowed by the city on cost of works, say, $358,074.23, making a total surplus of $493,980.54, after repaying the city for its investment. Then actual results are that the city owns its gas works, with entire outfit, without cost, and has received a bonus of $493,980.54."

Mr. J. W. Nourbourne has resigned the position of Cashier to the Springfield (Mass.) Gas Light Company, in the service of which he had been since 1887.

Col. Edward G. Pratt, the clever President and Manager of the Capital City Gas Light Company, of Des Moines, Ia., is to visit Europe this summer for an extended vacation. During the trip he will attend the convention of the International Commerce and Industrial Society, which will be held in Belgium. Prior to his departure he participated in a banquet, that was tendered him by the office force of the Company as a sort of farewell and good luck offering. Tne banquet was served in the main hall of the Grant Club, and it was in every sense a pleasant and enjoyable affair.

The Kansas City-Missouri Gas Company's report for the fiscal year ended April 30th shows net earnings of $304,428—an increase of $14,118 over the previous year—and a surplus after bond interest of $107,328—an increase of $8,801.

A correspondent forwards the following from Norwich, Conn., under date of June 21st: "The second step in the direction of municipal lighting control was taken about a fortnight ago by interests concerned in same in Norwich, Conn. On the 14th inst. the shareholders of the Norwich Gas and Electric Company voted unanimously to sell out their plants to the city of Norwich. Similar action will be taken soon by the Board of Directors. This action compels the city to purchase such plant as provided by the statute authorizing municipalities to go into the lighting business. The Company is then required by law to file, within 30 days, with the Clerk of the city of Norwich, a detailed schedule of its assets, describing the property and stating the terms proposed. The law provides that 'the price to be paid for such plant shall be its fair market value for the purposes of its use, including as an element of value the earning capacity of such plant, based upon the actual earnings being derived from such use, also including the market value of any other locations or similar rights acquired by the owners of such plant or plants, with the intention of using the same in connection with such plant or plants, less the amount of any mortgage or other incumbrances or lien to which the plant or plants so purchased or any part thereof, may be subject at the time of the transfer of title.' If the parties fail to agree as to the terms of sale, the law provides that after 30 days from the filing of the schedule either party may petition to the Superior Court or to any judge thereof, and the court or judge shall after a hearing appoint a commission of one or three persons to determine the price and other conditions of such sale. Appeals from the doings of this commission may be made to the court itself where the report of the commission in whole or in part may be set aside. From this court a further appeal may be taken to the Supreme Court of Errors. On the question as to whether or not the city could continue the supplying of electricity for power purposes and of gas for fuel, Mayor Thayer recently gave it as his opinion that it could, although the legislative act does not specifically so state."

Mr. J. K. Prior, owner of the gas plant at San Luis Obispo, Cal., informs us that certain Los Angeles capitalists, whom he believes should be known to us, have virtually agreed to give him his price for that property.

The articles incorporating the Light and Power Company, of St. Cloud, Minn., have been filed. As was said heretofore by the Journal, this Company succeeds to the rights and properties of the old St. Cloud Gas and Electric Company.

The following from a Boston newspaper, dated the 19th inst., explains itself: "A voluntary trust instead of a new corporation is now proposed for the reorganization of the New England Gas and Coke Company, and a plan has been formulated to carry out this project. The plan, which has been submitted to the bondholders and stockholders of the New England Gas and Coke Company, provides for the creation of the trust with 10 Trustees, to be known as the Massachusetts Gas Companies, to acquire the business of the New England Gas and Coke Company, for which purpose $30,000,000 in stock is to be issued, to be equally divided between common and preferred shares. Under the plan suggested, the preferred shares will be entitled to semi-annual preferred cumulative dividends at the rate of 4 per cent. per annum, which will begin to accrue Dec. 1, 1902; and will also be entitled, in case of liquidation, to be paid in full at par and accrued and in paid dividends before any payments are made on the common shares. Both preferred and common shares will have a par value of $100. Provisions will be inserted in the trust deed establishing the new Company, so that the shareholders will, so far as practicable, have the same control over its affairs as in the case of stockholders of corporations; and provisions will be inserted that the capitalization can be increased under proper limitations, for the acquisition of additional property or otherwise. The basis of exchange proposed is that bondholders shall receive in exchange for their bonds, with June 1, 1902, and all subsequent coupons attached, 52 per cent. at par of the face value in new preferred shares and 55 per cent. at par of the face value in new common shares."

The franchise for a gas plant at Whittier, Cal., has been granted to Mr. J. C. Hiatt, a resident of the named place.

Wm. Kennedy and associates seem to have the best chance of securing the consent of the authorities for the right to construct and operate a gas plant in Lead, So. Dak.

The Grand Rapids (Mich.) Gas Company proposes to extend its mains to the outlying village of East Grand Rapids.

The authorities of Topeka, Kas., have granted an extension of 1 year, to the promoters of the Federal Light, Heat and Power Company, in which to complete their proposed plant. The franchise was originally granted in 1900, and the promoters then pledged themselves to have the works in operation in 1903. The whole thing is a strike, pure and simple.

The Fireproofing of Steel Work in Buildings.

This matter was recently the subject of an interesting legal decision in Germany. The police authorities of the city of Hanover had ordered that the exposed structural ironwork in a certain new building must be protected with fireproofing. The owners of the buildings sued against enforcement of the order, but they were defeated in the original suit as well as in final appeal. The jurisdiction of the police authorities in the matter is established by the lack of any provision regarding fireproofing of steel work in the building regulations of the city. It appeared from expert testimony that at temperatures of 600° to 800° C., as are realized in fires, the steel columns and beams were weakened, and would allow the building they carried to collapse. Further, that surrounding the ironwork by protecting material would prevent such overheating in case of fire.

The lower floors of the buildings in question were for store and warehouse use; the upper stories were used as living rooms. These conditions created a possibility of conditions of danger which justified the order issued by the police authorities. One contention of the plaintiffs was that the order would only be justified if necessary to prevent or correct actual, not merely possible, conditions of danger, and that it must be shown that the danger would be immediately impending if the police did not interfere. The court held that the danger need not be thus immediate, but that the order was justified if there was a reasonable possibility of the danger arising.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,

PROPRIETORS.

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OHIO GAS LIGHT ASSOCIATION.
PACIFIC COAST GAS ASSOCIATION

Notification Respecting Advertising.—Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JUNE 30, 1902.

The Market for Gas Securities.

The trading in city gas shares was in fairly large volume for the week, but it was mostly done at figures noticeably lower than those that prevailed last week on the average. To-day (Friday) at the close the quotations for Consolidated were 220 to 220½, which is virtually a duplication of the figures of last Friday.

Brooklyn Union was neglected as far as actual sales are concerned since time of last writing. The nominal quotation for it is 230 to 240.

There is some talk that the new owners of the Kings County Gas and Illuminating Company are inclined to go after business in territory within the limits of that heretofore regarded as controlled by the Brooklyn Union Company. This is likely idle talk or talk put out by those who would welcome a break in B. U. stock.

In the outside market there is nothing of moment to relate.

Baltimore Consolidated is 70 bid. The contest over the next annual election for officers in the Company is quite animated.

Washington (D. C.) gas is 360 bid, and Bay State is up to 2 again. Messrs. H. Content & Co. say they are having good success in answer to their appeals for deposits of Bay State stock, "in order that some concerted action to establish our rights as stockholders may be taken."

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 30.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	220	220½
Central Union, Bonds, 5's.	3,000,000	1,000	109	110
Equitable Bonds, 6's	1,000,000	1,000	105	
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	350	..
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. .. Bonds, 5's	11,000,000	1,000	111½	..
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River.. Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	
Standard	5,000,000	100	130	140
Preferred	5,000,000	100	150	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	117
Yonkers	299,650	500	130	.
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	230	240
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	2	2¼
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	13	13¼
" " Bonds, 5's	5,250,000	1,000	83½	84½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104½
Cincinnati Gas & Elec. Co.	29,500,000	100	102¼	103½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	108	109
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89½
Preferred	3,026,500	100	106¾	107¾
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	70	70¼
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	.	.	112
Consolidated Gas Co. of N.J.	1,000,000	100	14	17
" Con. Mtg. 5's	380,000	1,000	86	87
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	.	89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	852,000	1,000	77	79
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	.	.
" Bonds	2,000,000	..	58	63
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	75	80
" Bonds, 6's	2 650,000	..	102	104
Jackson Gas Co	250,000	50	74	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	85	89
Preferred	2,500,000	100	103	109
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	53	61
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	1 [illegible]
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	300	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	103¾	104⅞
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	43	43½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	95	96½
Syracuse, N. Y.	1,750,000	100	15	17
Bonds	1,612,000	1,000	95½	97½
Washington, D. C	2,600,000	20	360	365
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	109½	110
Wilmington, Del.	600,000	50	232	..

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., June 11, 1902.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1902, to stockholders of record at the close of business, June 30, 1902. Checks will be mailed.

1410-3 LEWIS LILLIE, Treasurer.

POSITION WANTED AS MANAGER,

By a hustler for new business. Has experience in selling gas stoves; also in laying high and low pressure mains Understands the manufacture of coal and water gas in detail. Experience in reconstruction of benches and water gas apparatus. Was superintendent of gas works for number of years. Now in charge of new business department of one of the largest gas companies in the Union. Will furnish all required references. Address, "G. L.," care this Journal.

1409-4

WANTED.

AN UP-TO-DATE MANAGER, of many years' experience in the gas business, desires to secure a connection with some good gas company, in a position of trust and responsibility, as soon as possible. Address,

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A YOUNG MAN, of years of experience in the gas business, desires to secure a position of trust and responsibility with some good gas company. Best of references given.

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1,800 Gasoline Burners and Tanks, complete, for Street Lights.

Used very little. Good as new. Address,
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1409-5 Providence, R. I.

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Apparatus for Complete Water Gas Plant,

Consisting of 5-ft. cupolas; purifying boxes, with center seal; engine, boiler, blower and holder.

Address, "P. R. R.,"
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GAS ENGINES FOR SALE.

Having made a change in our plant, we offer for sale

THREE OTTO GAS ENGINES,

of 50-horse power each; also, one starter. All in good condition. For terms, apply to

WILLIMANTIC GAS AND ELECTRIC LIGHT CO.,
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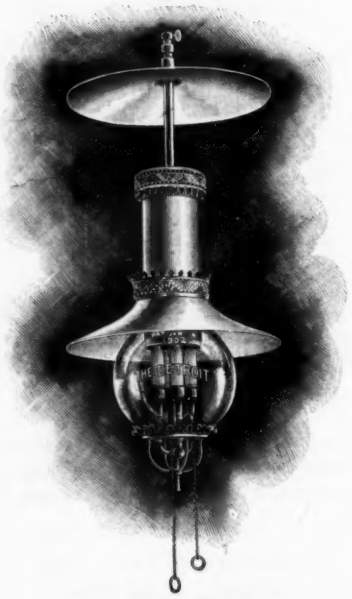

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Durability,
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Simplicity,
Economy.

Perfect Combustion.
No Chimneys to Break.
No Matches Necessary.
Consumes Less Gas.
A Handsome Fixture.
Always in Order.

Our lamp gives 25 per cent. ***more light*** with 20 cent. ***less gas*** than any Arc Gas Lamp now on the market.

TO LIGHT CONSUMPTION WHAT THE GAS RANGE IS TO FUEL. : : : : : :

SAMPLE ORDERS *Solicited.*

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The Detroit Arc Gas Light Co.,
67 to 71 Michigan Avenue,
DETROIT. MICH.

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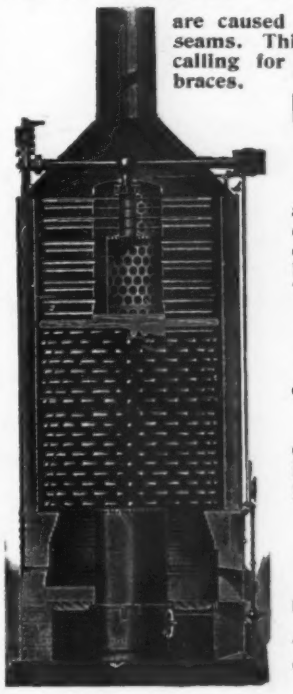

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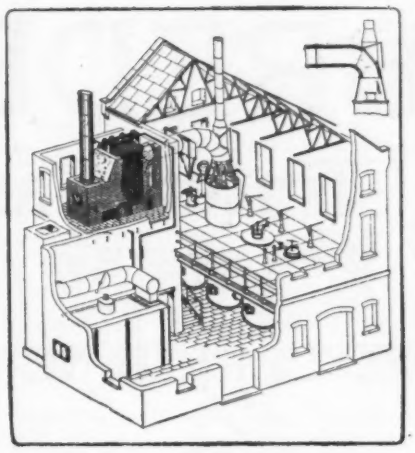

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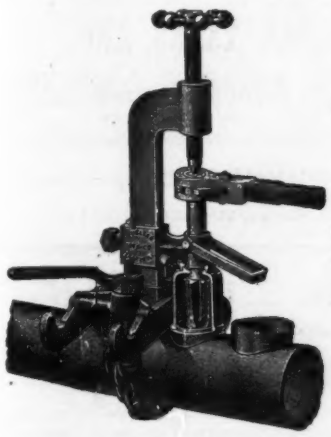

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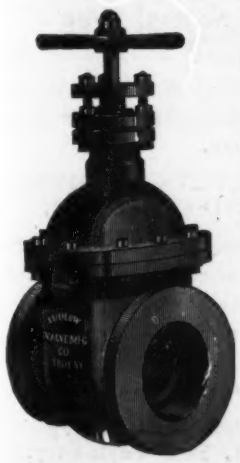

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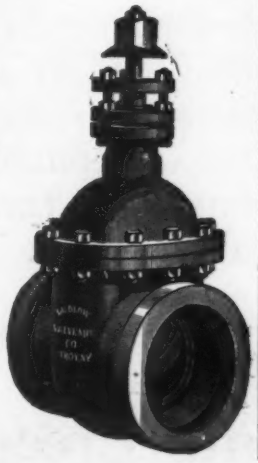

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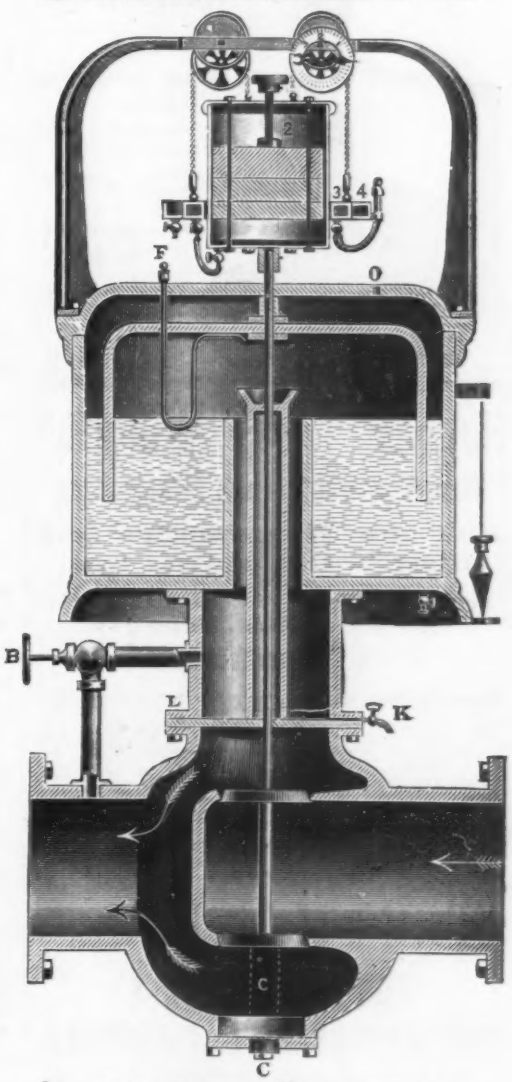

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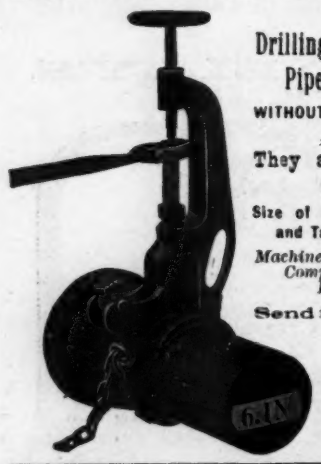

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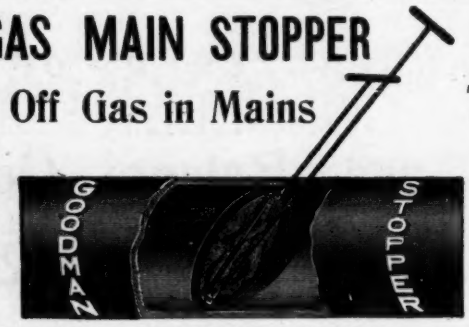

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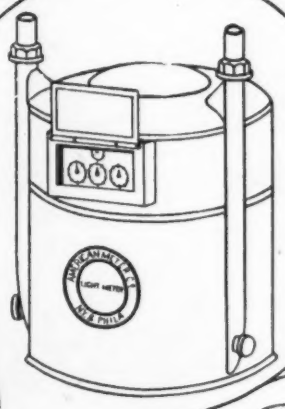

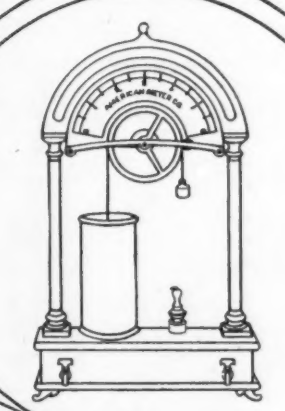

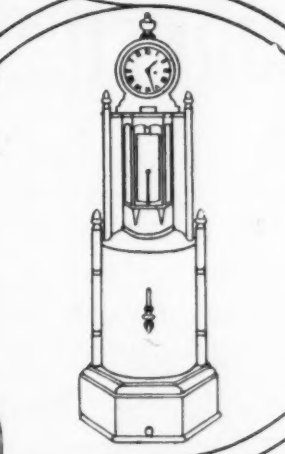

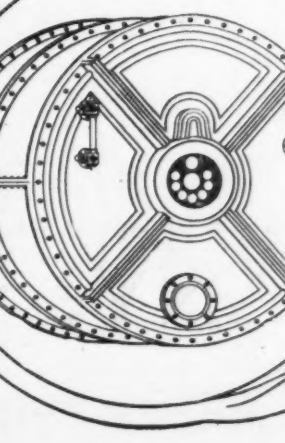

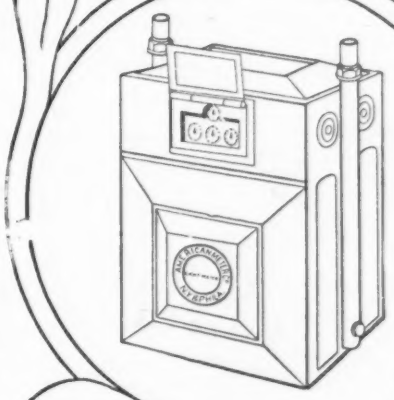

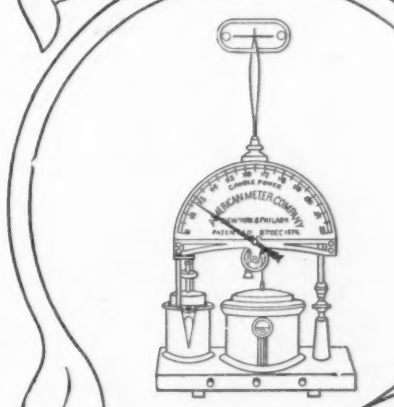

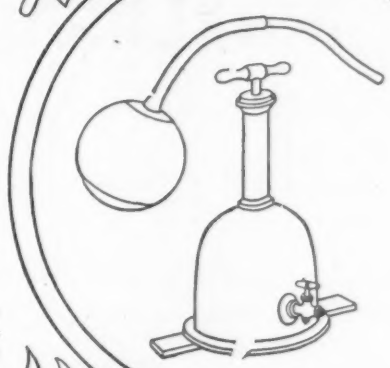

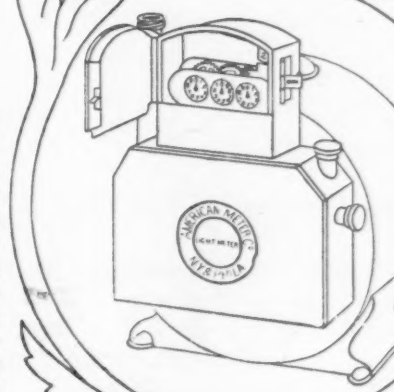

PUBLIC LIGHTING TABLE.

JULY, 1902.

Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Tue.	1	8.00 PM	2.50 AM	7.30	3.15
Wed.	2	8.00	3.40	7.30	3.15
Thu.	3	8.00	3.40	7.30	3.15
Fri.	4	8.00	3.40	7.30	3.15
Sat.	5	8.00 NM	3.40	7.30	3.15
Sun.	6	8.00	3.40	7.30	3.15
Mon.	7	8.00	3.40	7.30	3.15
Tue.	8	8.00	3.40	7.30	3.15
Wed.	9	8 00	3.40	7.30	3.15
Thu.	10	9.40	3.40	7.30	3.15
Fri.	11	10.10	3.40	7.30	3.15
Sat.	12	10.40 FQ	3.40	7.30	3.15
Sun.	13	11.20	3.40	7.30	3.15
Mon.	14	11.50	3.40	7.30	3.15
Tue.	15	12.30 AM	3.40	7 30	3.15
Wed.	16	1.20	3.40	7.20	3.15
Thu.	17	2.00	3.40	7.20	3.15
Fri.	18	3.00	3.40	7.20	3 15
Sat.	19	No L.	No L.	7.20	3.15
Sun.	20	No L. FM	No L.	7.20	3.15
Mon.	21	No L.	No L.	7.20	3.15
Tue.	22	7.50 PM	9.20 PM	7.20	3.15
Wed.	23	7.50	9.50	7.20	3.15
Thu.	24	7.50	10.20	7.20	3.15
Fri.	25	7.50	10.50	7.20	3.15
Sat.	26	7.50	11.20	7.20	3.15
Sun.	27	7.50 LQ	12.00	7.20	3.15
Mon.	28	7.50	12.40 AM	7.20	3.15
Tue.	29	7.50	1.30	7.20	3.15
Wed.	30	7.50	2.30	7.10	3.30
Thu.	31	7.50	4.00	7.10	3.30

TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	238.30	January	423.20
February	196.20	February	355.25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280.25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45

NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

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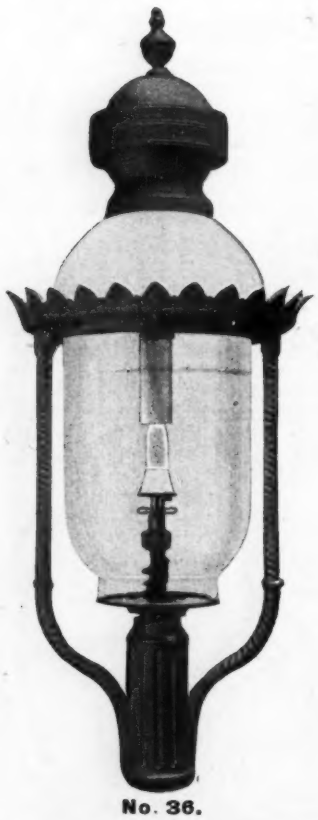
.... OF AMERICA ....



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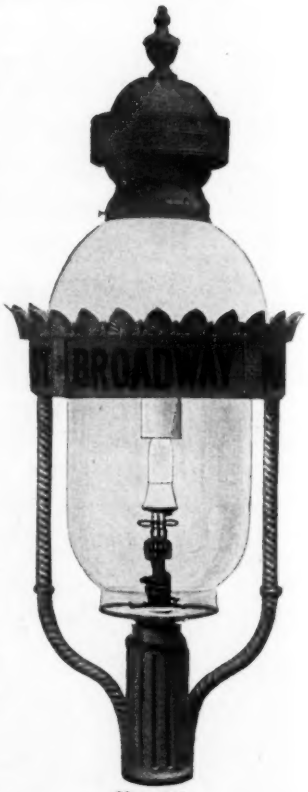

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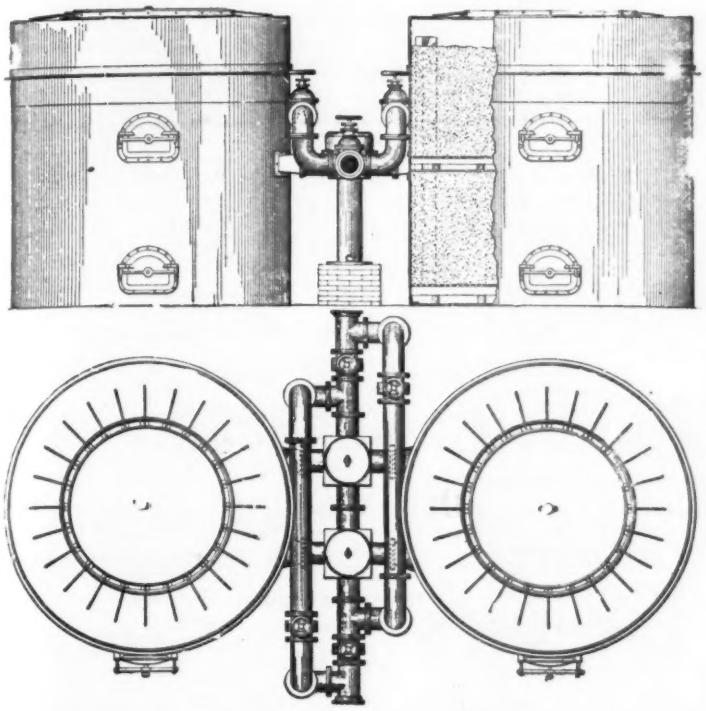

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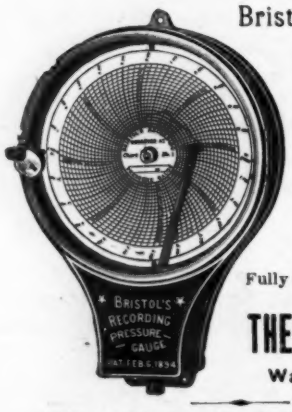

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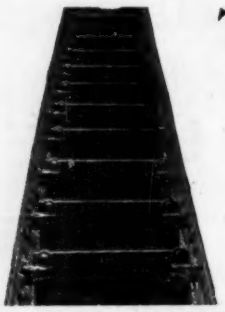

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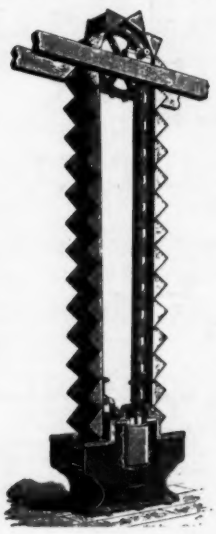

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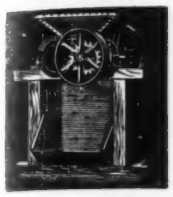

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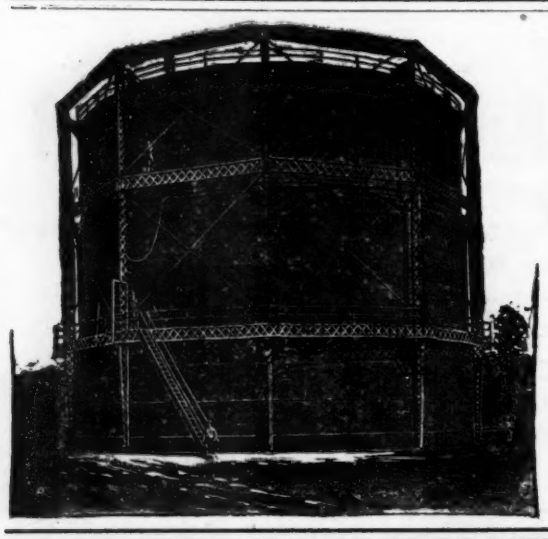

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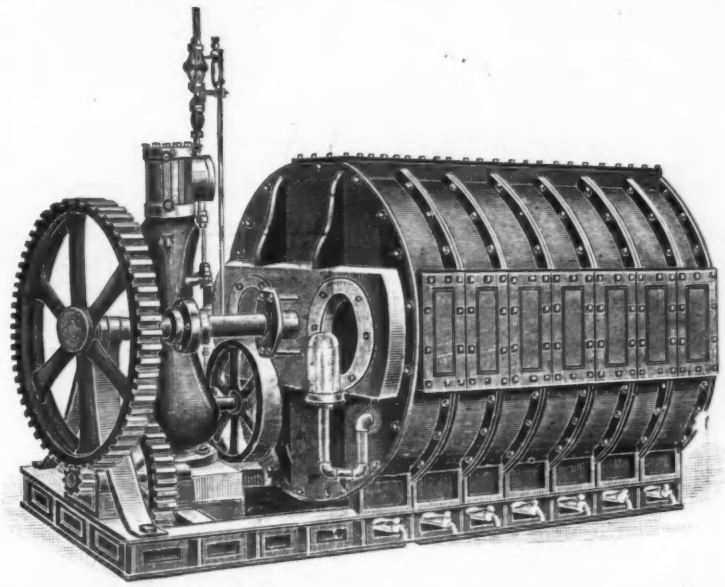

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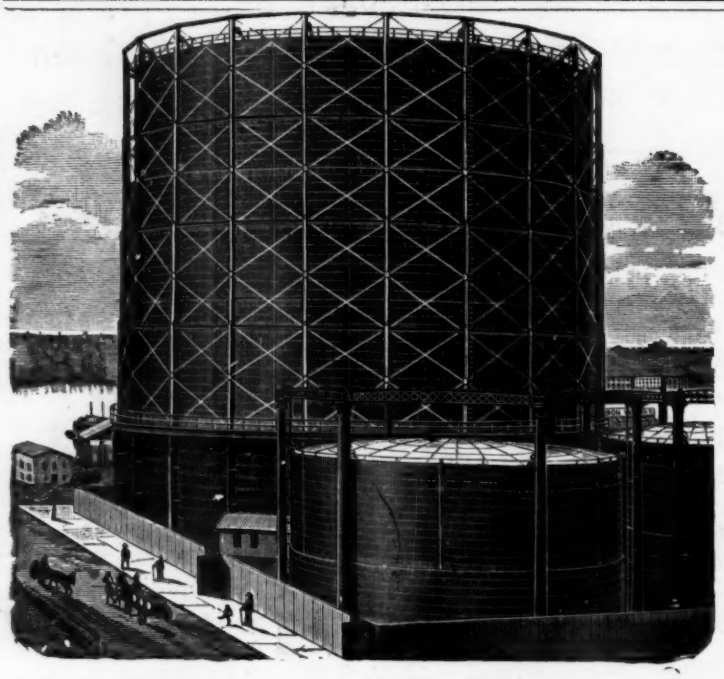

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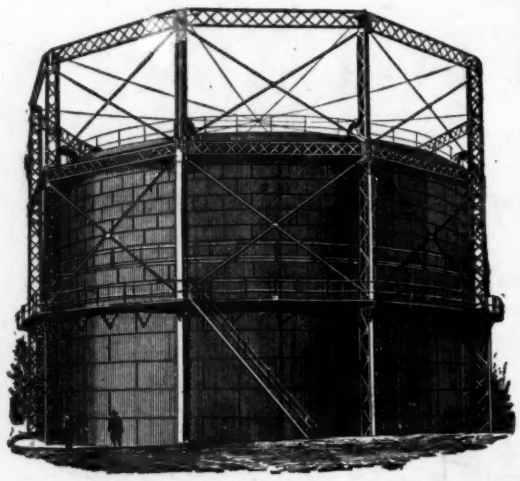

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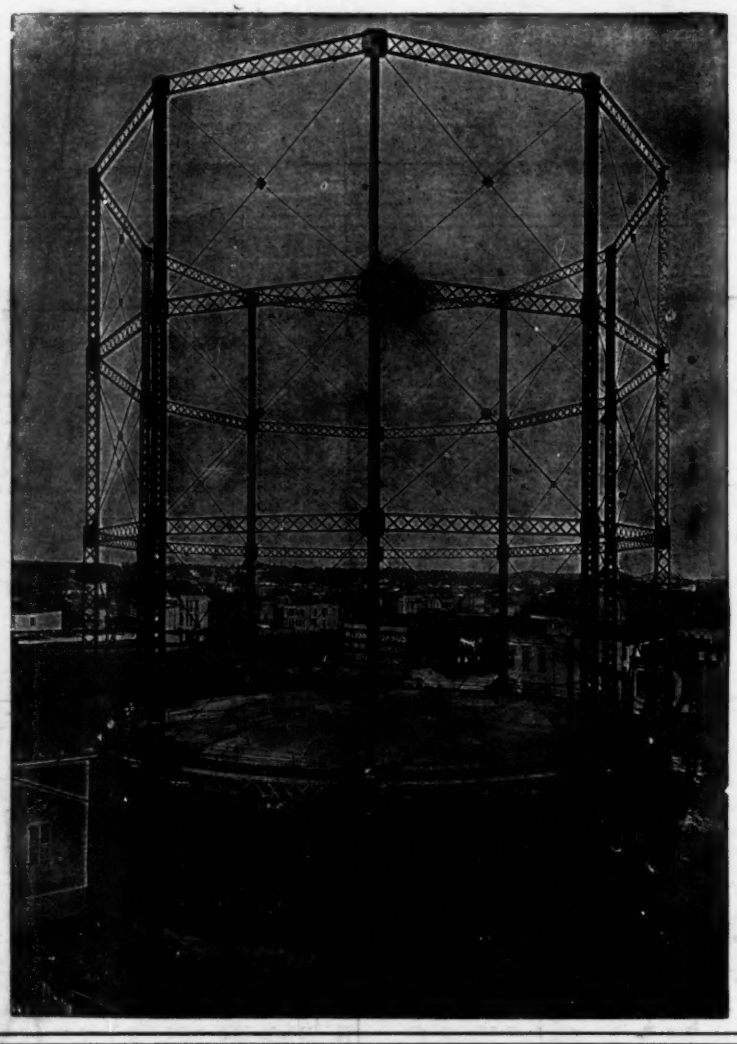

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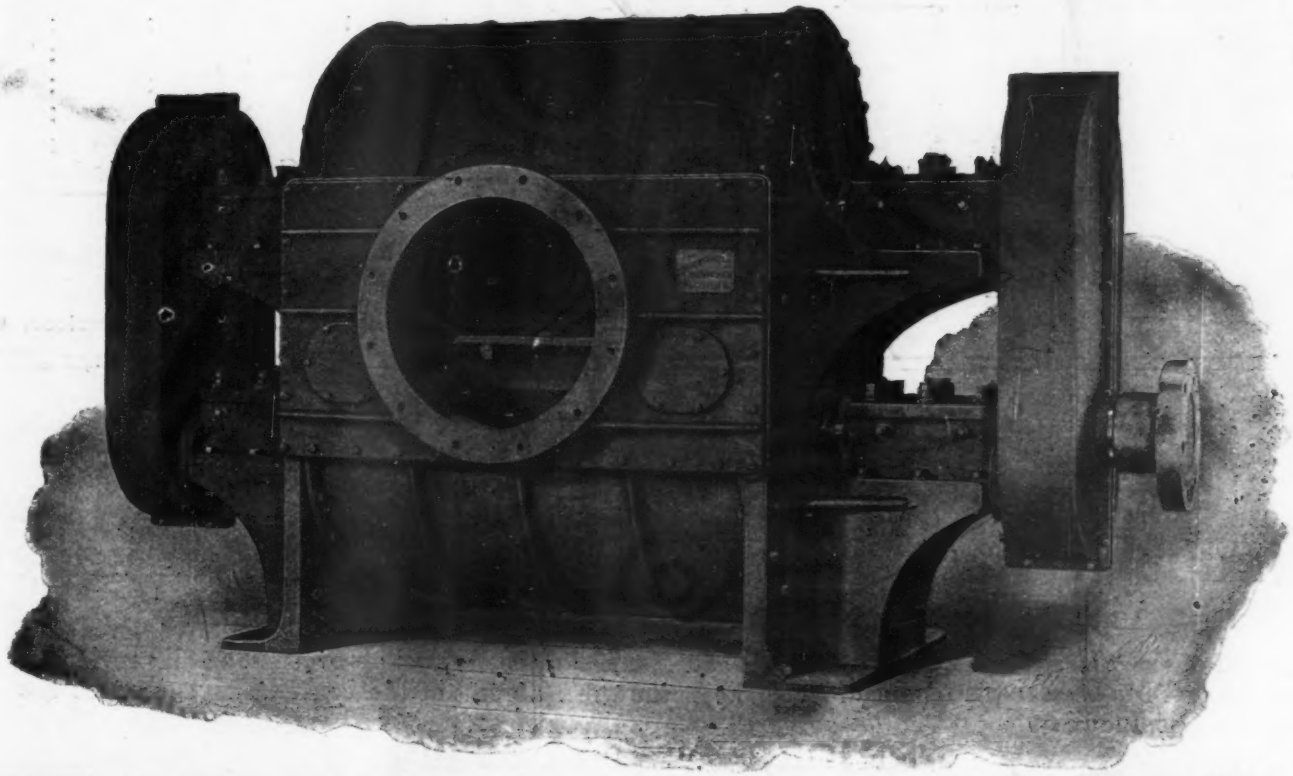

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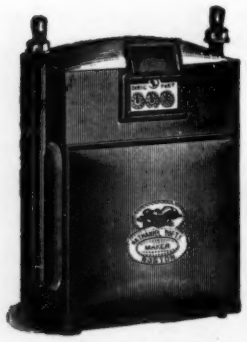

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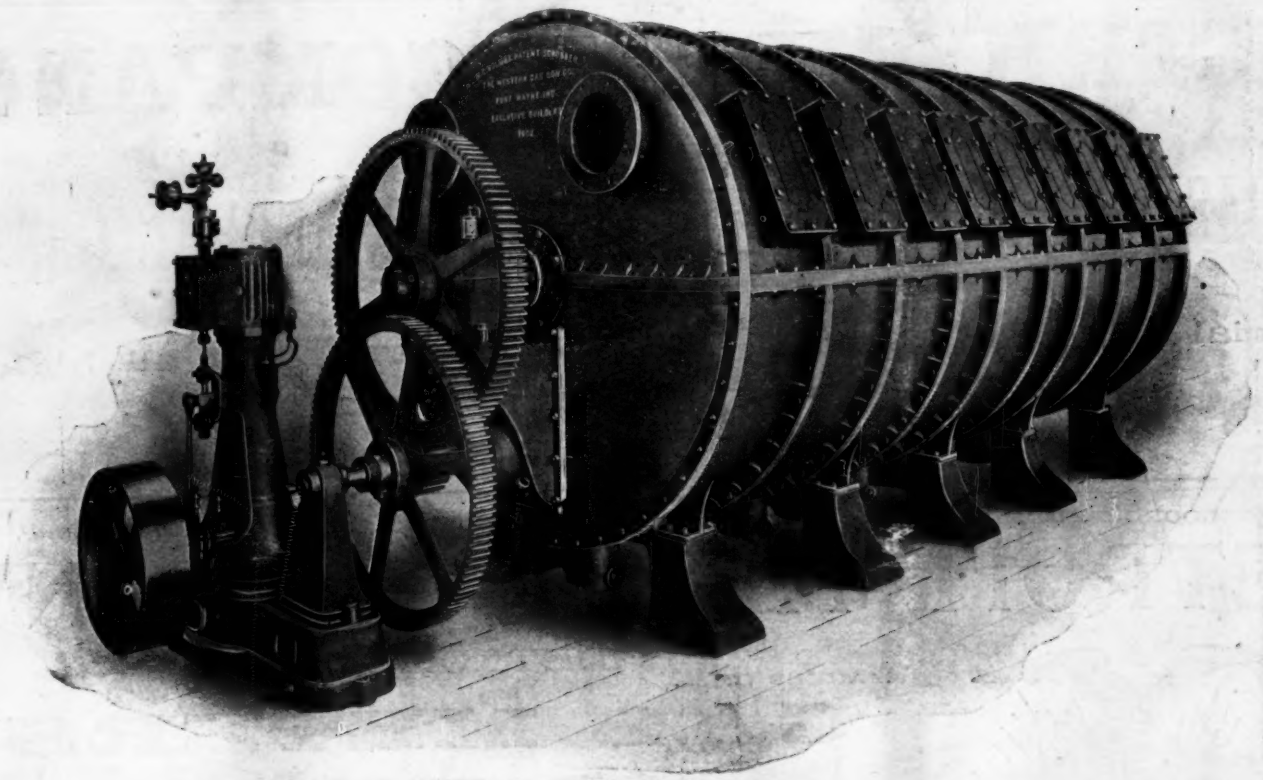

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